D-5/D-50

SERVICE MANUAL

D-5:
US Model
D-50:
AEP Model
UK Model
E Model

COMPACT
disc
DIGITAL AUDIO

SPECIFICATIONS

System	Compact disc digital audio system
Disc	Compact disc
Laser	Semiconductor laser (λ = 780 nm)
Spindle speed	200 r.p.m. to 500 r.p.m.(CLV)
Scan velocity	1.2–1.4 m/sec.
Error correction	Sony Super Strategy Cross Interleave Read Solomon Code
Number of channels	2
D-A conversion	16-bit linear
Frequency response	20–20,000 Hz $^{+1}_{-3}$ dB
Harmonic distortion	Less than 0.008 % (1 kHz) (Model D-5) Less than 0.0095 % (1 kHz) (Model D-50)
Dynamic range	More than 90 dB (1 kHz)
Channel separation	More than 85 dB (1 kHz) (Model D-5) More than 82 dB (1 kHz) (Model D-50)
Wow and flutter	Below measurable limit
Outputs	Line output (stereo minijack) Output level 1.6 V rms (at MSB) Load impedance over 10 kilohms Headphones (stereo minijack) 10 mW + 10mW at 32 ohms

Disc

Track pitch	1.6μm
Sampling frequency	44.1 kHz
Quantization	16 bit linear quantizing/channel
Modulation system	EFM
Transfer rate	2.03 Mbit/sec. (before modulation)

General

Power requirements	DC 9V, six alkaline batteries, size C (IEC designation LR14) or six KR-C-F-2 nickel-cadmium rechargeable batteries used in optional Sony EBP-9LC battery case DC IN 9V jack accepts; Sony ac power adaptor (supplied) for use on 120 V ac, 60 Hz or Sony DCC-120 car battery cord (optional) for use on 12 V car battery
Power consumption	4 W
Dimensions	Approx. 127×36.9×132.5 mm (w/h/d) (5×1½×5¼ inches) not incl. projecting parts and controls Approx. 127.5×42×133 mm (w/h/d) (5⅛×1¾×5¼ inches) incl. projecting parts and controls
Weight	Approx. 590 g (1 lb 5 oz), net

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

MICROFILM

COMPACT DISC COMPACT PLAYER

SONY®

AUD

FEATURES

Extremely compact size for easy transport
By connecting the optional Sony EBP-9LC battery case, this CD jacket-sized player can be operated on batteries, which enables you to enjoy the sound of Compact Discs anywhere you want.

High performance and fidelity
Flat frequency response (20–20,000 Hz), low wow and flutter (lower than the measurable limit), wide dynamic range (more than 90 dB), minimal distortion (less than 0.008%) and high channel separation (more than 85 dB) are achieved. Listening to the sound reproduction is just like being in the concert hall.

Full-logic "feather touch" operation
At the lightest touch, the "feather-touch" function keys enable you to switch directly from one mode to another.

AMS and SEARCH function
The AMS (Automatic Music Sensor) function for locating the beginning of a selection on the disc and the SEARCH function for locating the desired point in a particular selection.

Digital readout display
The track number and the playing time elapsed of the selection playing is shown on the LCD(Liquid Crystal Display) window. With one touch of the REMAIN button, this time display will change to indicate with a minus sign how many selections and how much playing time are left on the disc.

Non-contact signal readout system
Because a laser beam is employed for signal pick-up, there is no physical contact with the disc, which means no wear.
In addition, because the pit pattern is recorded below the surface of the disc, it is not necessary to be constantly on guard against dust, making the disc easy to handle.

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PROTECTION OF EYES FROM LASER BEAM DURING SERVICING

This set employs a laser. Therefore, be sure to follow carefully the instructions below when servicing.

WARNING !!

DO NOT LOOK AT THE LASER BEAM.

1. Laser Diode Properties
   - Materiale: GaAlAs
   - Wavelength: 780 nm
   - Emission Duration: continuous
   - Laser Output: max. 0.4 mW*

     * This output is the value measured at a distance of about 1.6 mm from the objective lens surface on the Optical Pick-up Block.
   - Classification: Class IIIb
2. During service, do not take the Optical Pick-up Block apart, and do not adjust the APC circuit in the Optical Pick-up Block. If there is a breakdown in the APC circuit (including laser diode) in the Optical Pick-up Block, replace the entire Optical Pick-up Block (including APC board).

BESKYTTELSE AF ØJNE MOD LASERSTRÅLING UNDER SERVICE

I dette apparat anvendes laserlys. Derfor skal nedenstående instruktioner nøje følges under service.

ADVARSEL!!

Se ikke direkte på laserstrålen.

1. Laser-diode data
   - Materiale: GaAlAs
   - Bolgelængde: 780 nm
   - Udsendelsesvarighed: Kontinuerlig
   - Laseroutput: Max. 0,4 mW*

     * Dette output er værdien målt i en afstand af ca. 1,6 mm fra den optiske pick-up enheds linseoverflade.
   - Klassifikation: Klasse IIIb.
2. Adskil aldrig den optiske pick-up enhed under service, og juster ikke APC kredsløbet i den optiske pick-up enhed (Automatic Power Control). Hvis APC kredsløbet i den optiske pick-up enhed (inkl. laser-dioden) bryder ned, skal hele den optiske pick-up enhed udskiftes.

– CAUTION FOR ELECTROSTATIC BREAKDOWN –

NOTES ON HANDLING THE OPTICAL PICK-UP BLOCK (KSS-110A)

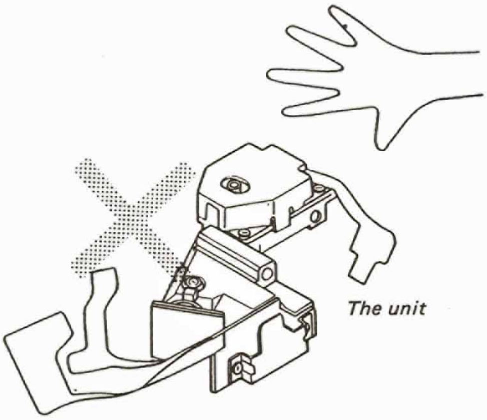
The laser diode in the optical pick-up block may suffer electrostatic breakdown because of the potential difference generated by the charged electrostatic load, etc. on clothing and the human body.
The printed matter below is included in the repair parts. During repair, use the procedure in the printed matter.
The flexible board is easily damaged and should be handled with care.
The following method is an example for reference purposes:

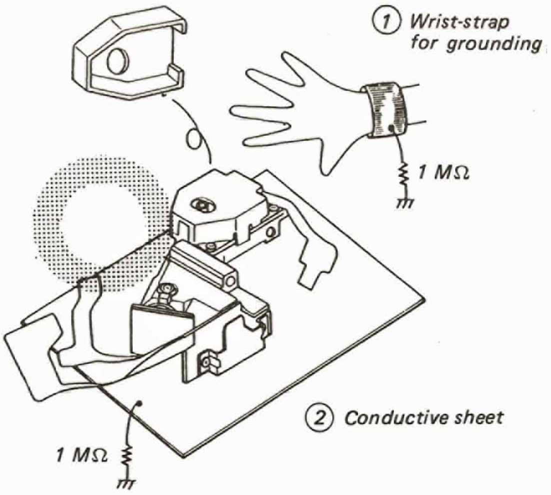
1. Place a conductive sheet on the workbench. (The black sheet used as repair parts wrapping).
2. Place the set on the conductive sheet so that the chassis touches the sheet. (This makes it the same potential as the conductive sheet).
3. Place your hands on the conductive sheet. (This makes them the same potential as the sheet).
4. Remove the optical pick-up block.
5. Perform work on top of the conductive sheet. Be careful that clothing does not touch the optical pick-up block.

Printed Matter Included in the Repair Parts

When opening or repairing the unit, the procedure for grounding as follows is required to prevent damage caused by static electricity.

1. Grounding for the human body
   Be sure to put on a wrist-strap for grounding (with impedance lower than 10^8 Ω) whose other end is grounded. The strap works to drain away the static electricity build-up on the human body.
2. Grounding for the work table
   Be sure to lay on the table a conductive sheet (with impedance lower than 10^9 Ω) such as sheet of copper, which is grounded.
3. As static electricity build-up on clothes is not draindead away, be careful not to let your clothes touch the unit.
4. Handling the flexible board
   The flexible board is easily damaged and should be handled with care.





Chip Component Indications

The official specifications which are presently indicated are EIAJ standard.

(1) MELF (leadless): EIAJ RC-8001

(2) Square chip components (laminated ceramic): EIAJ RC-3699. Square chip resistors are presently under study by EIAJ.

The following explanation covers square chip components (MELF omitted).

1. 2-letter Method (EIAJ RC-3699)

- Letter combination: letter + 1 number
- Letter meaning: letter = effective numeric
  number = multiplier

* The units used are pF for capacitors and Ω (ohm) for resistor.

(This is mainly used for Symbol and Numeric and Multiplier capacitors.)

Letter	A	B	C	D	E	F	G	H	J	K	L
Numeric	1	1.1	1.2	1.3	1.5	1.6	1.8	2	2.2	2.4	2.7
Letter	M	N	P	Q	R	S	T	U	V	W	X
Numeric	3	3.3	3.6	3.9	4.3	4.7	5.1	5.6	6.2	6.8	7.5
Letter	Y	Z	a	b	d	e	f	m	n	t	y
Numeric	8.2	9.1	2.5	3.5	4	4.5	5	6	7	8	9

Number	0	1	2	3	4	5	6	7	8	9
Maltiplier	10^0	10^1	10^2	10^3	10^4	10^5	10^6	10^7	10^8	10^{-1}

- Ex.: A1 $1 \times 10^1 = 10$ pF (or, 10Ω)
  E3 $1.5 \times 10^3 = 1500$ pF (or, 1.5 kΩ)

2. 3-number Method

(Mainly used for chip resistors)

- Number meaning:

  1st and 2nd number = effective numeric
  3rd number = multiplier of 10

  Unit: pF for capacitor, for resistor

- Ex.: 103 $10 \times 10^3 = 10000\Omega = 10$ kΩ (or, 0.01 μF)
  224 $22 \times 10^4 = 220000\Omega = 220$ kΩ (or, 0.22 μF)

3. 4-letter Method (used for capacitor)

- Letter combination: 3 numbers + 1 letter
- Letter meaning: number = effective numeric + multiplier of 10
  (same as 3-number method)
  letter = capacitor response
- Symbol and Response

〈For temperature compensation〉

Symbol	C	P	R	S	T	U	(NO)
Response	CΔ	PΔ	RΔ	SΔ	TΔ	UΔ	SL

Δ is temperature coefficient tolerance, and is G, H, J, K.

〈For high dielectric constant〉

Symbol	K	Z
Response	B	F

- Ex.:

47
3Z ➡ $47 \times 10^3 = 47000$pF = 0.047μF F response

15
1R ➡ $15 \times 10^1 = 150$pF RΔ response

22
2 ➡ $22 \times 10^2 = 2200$pF SL response

Replacing chip components

All chip components should be connected and disconnected, using a tapered soldering iron [temperature of the iron tip: less than 280°C (536°F)], a pair of tweezers and braided wire.

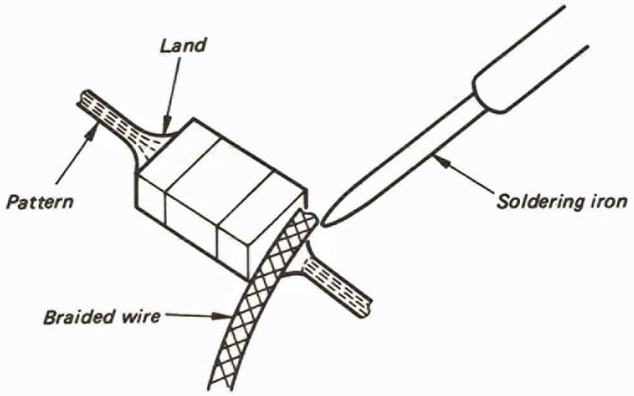
Precautions for replacement

1. **Do not disconnect the chip component forcefully. Otherwise, the pattern may peel off.**
2. **Never re-use a disconnected chip component. Dispose of all old chip components.**
3. **To protect the chip component, heating time for attaching the component should be within 3 seconds.**

○ Removing chip components

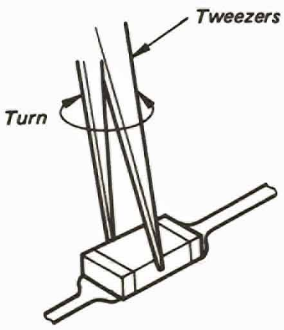
(1) Removing solder at electrode

Remove the solder at the electrode, using a thin braided wire. Do not remove the solder of the part (chip component) attached adjacent to the electrode.



(2) Disconnecting chip components

Turn the tweezers with the soldering iron alternately applied to both electrodes, and the chip component will be disconnected. Take careful precautions while disconnecting, because if the chip component is forcefully removed the land may peel off.
Never re-use a disconnected chip component.



(3) Smoothing the soldered surface

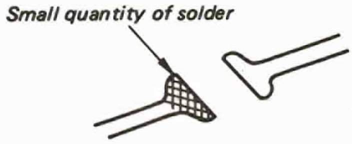
After disconnecting the chip component, remove the solder by using a braided wire to smooth the land surface.

○ Connecting chip components

The value of chip components is not displayed on the main body. Take due precautions to avoid mixing new chip components with other ones.

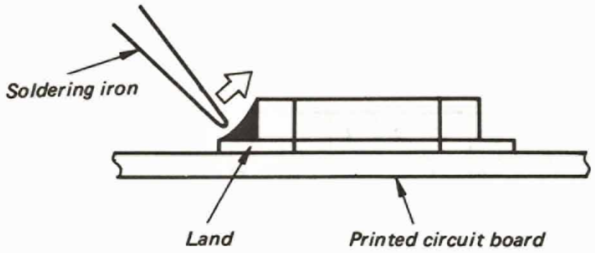
(1) Applying solder to land on one side

Apply a thin layer of solder to the land on one side where the chip component is to be connected. Too much solder may cause bridging.



(2) Speedy soldering

Hold the chip component at the desired position, using tweezers, and apply the soldering iron in the arrow-marked direction. To protect the chip component, heating time should be within 3 seconds.



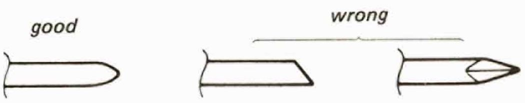
(3) Speedy soldering of electrode on the other side

Solder the electrode on the other side in the same way as in (2) above.

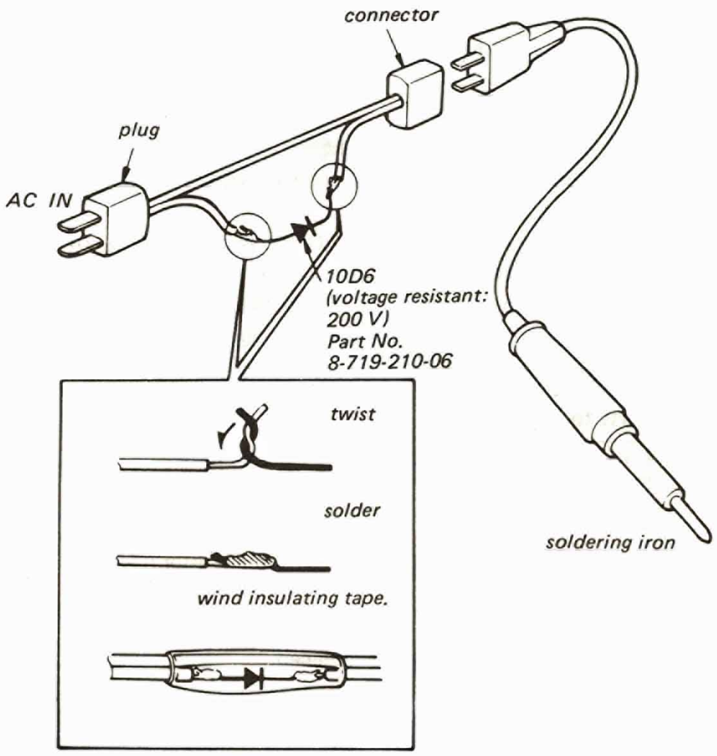
Flexible Circuit Board Repairing

1. Keep the temperature of the soldering iron at 270° ± 10°C during repairing.
   You can maintain the temperature of the soldering iron around 270°C by using the thermal controller as illustrated on the right.
2. Do not touch the soldering iron more than 4 seconds or 3 times on the same conductor of the circuit board.
3. Do not apply force on the conductor when soldering or unsoldering.

Tip of soldering iron

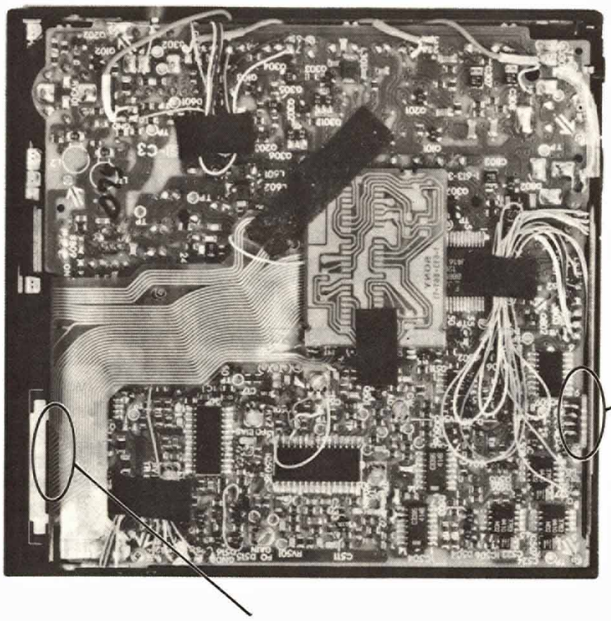


To make thermal controller of soldering iron


connector
plug
AC IN
10D6
(voltage resistant:
200 V)
Part No.
8-719-210-06
twist
solder
wind insulating tape.
soldering iron

NOTES ON OPENING MAIN BOARD

Be careful not to cut the FOP flexible boards when opening the main board during repair. If they break, FOP should be replaced.



Be careful not to break the flexible board which is attached to the end of this board.
(connected to FOP 2-axis device)

Be careful not to break the flexible board under this shield board.
(connected to FOP signal and laser)

NOTES ON REPLACING IC801 (MB88541-120M) (MODEL D-5 ONLY)

Part of the program and the clock frequency have been changed on this model's microcomputer.

(Old)		(New)
MB88541-120M	➡	MB88541-124M
clock frequency: 1.2 MHz		clock frequency: 1.3 MHz

The repair IC supplied for IC801 is a new type of MB88541-124M. Therefore, when replacing IC801 on a set with serial No. up to 104,000 which uses the old microcomputer (MB88541-120M), be sure to change resistors R513, R809 as shown below.

Parts to be replaced:

Ref. No.	Part No.	Description
R513	1-216-080-00	metal film resistor (chip), 20 kΩ 5% 1/10W
R809	1-216-331-11	metal film resistor (chip), 9.1 kΩ 1% 1/10W

CAUTION ON DC-DC CONVERTER REPLACEMENT

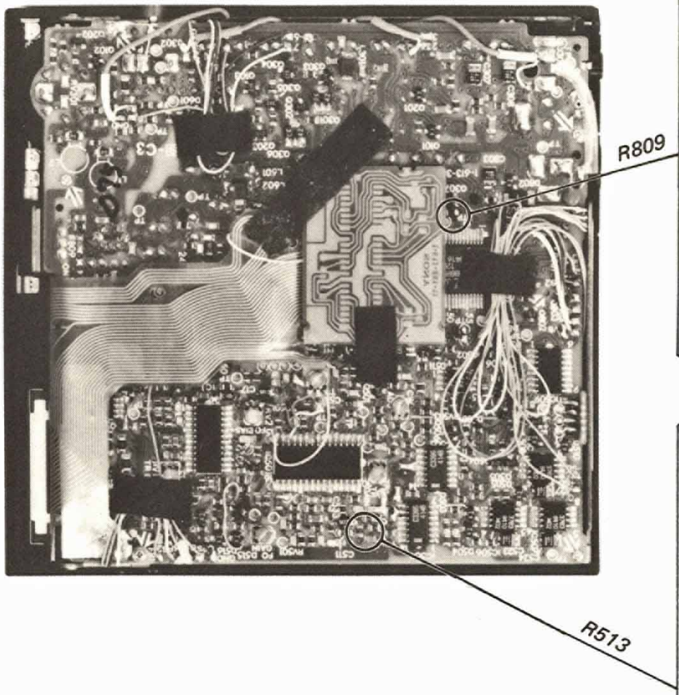
Be sure to check PLL free run frequency when replacing the DC-DC converter. (Refer to page 36) DC-DC converter −5V output voltage changes when the DC-DC converter is replaced, causing PLL free run frequency to change.

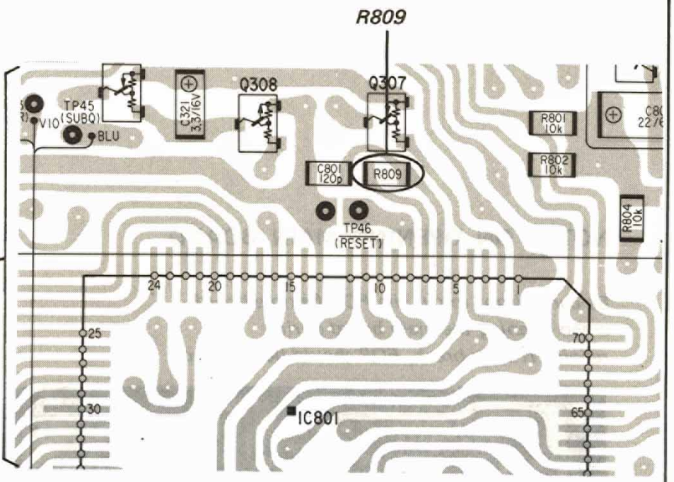
Reference:

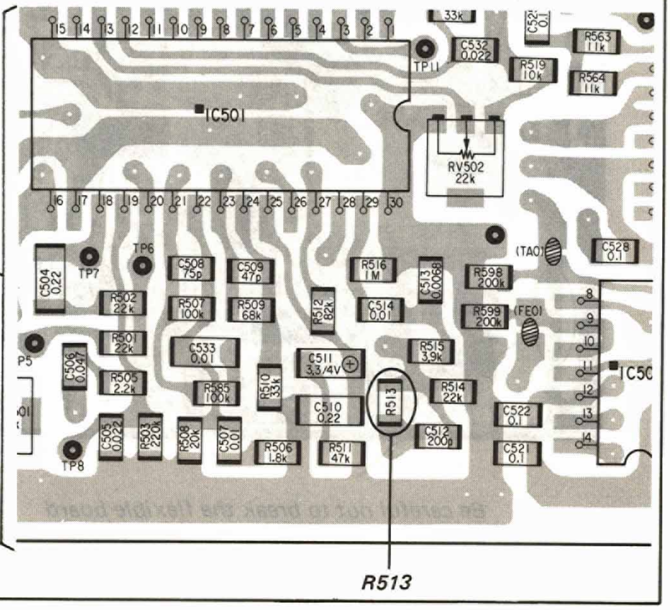
Converter Output Voltage Variation

Conditions	Specifications
mechanical voltage DC +5 – 12 V	+5 V output: DC +5.2 V ± 50 mV −5 V output: DC−5.2 V ± 50 mV

- **Location of parts to be replaced**




R809
Q308
Q307
TP45 (SUBQ)
V10
BLU
C321 3.3/16V
C801 120p
R809
R801 10k
R802 10k
R804 10k
TP46 (RESET)
24
20
15
10
5
1
25
30
70
65
IC801


15 14 13 12 11 10 9 8 7 6 5 4 3 2 1
33k
C532 0.022
TP11
R519 10k
R563 11k
R564 11k
IC501
RV502 22k
16 17 18 19 20 21 22 23 24 25 26 27 28 29 30
(TAO)
C528 0.1
TP6
TP7
C504 0.22
C508 75p
C509 47p
R516 1M
C513 0.0068
R598 200k
R599 200k
(FEO)
R502 22k
R507 100k
R509 68k
R512 82k
C514 0.01
R501 22k
C533 0.01
C511 3.3/4V
R515 3.9k
P5
C506 0.047
R505 2.2k
R585 100k
R510 33k
C510 0.22
R513
R514 22k
C522 0.1
C505 0.022
R503 220k
R508 20k
C507 0.01
R506 1.8k
R511 47k
C512 200p
C521 0.1
TP8
8
9
10
11
12
13
14
R513

SERVICE MODE (service program)

As shown in Figure 1, the program on this set selects either service program routine or normal routine after power supply is connected and a RESET signal enters. When it enters service program routine, the microcomputer brings the necessary job from each subroutine corresponding to the key input, and executes that job. Operation check can be performed efficiently using this mode. The operation method of service mode is explained below.

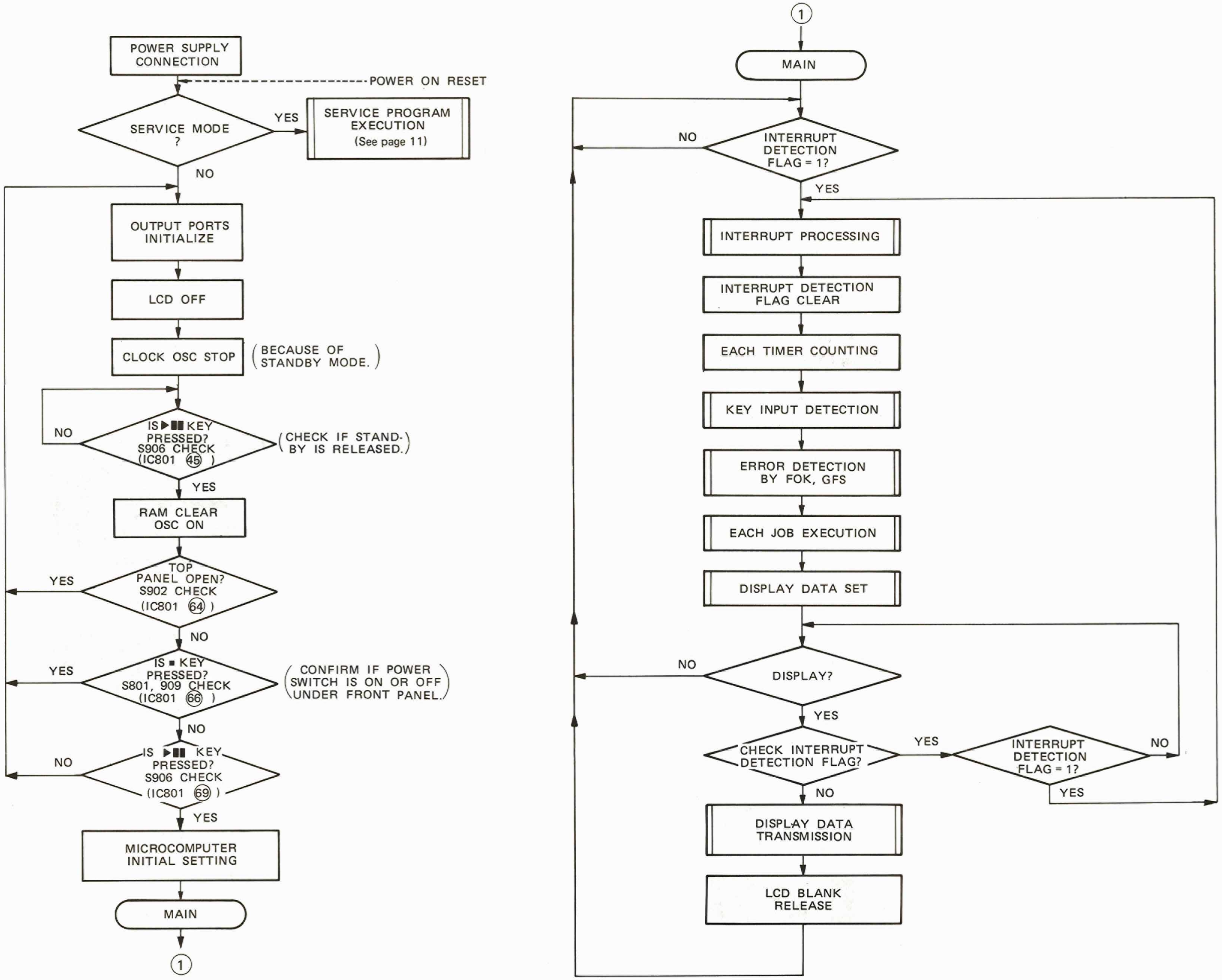

POWER SUPPLY CONNECTION
POWER ON RESET
SERVICE MODE ?
YES
SERVICE PROGRAM EXECUTION (See page 11)
NO
OUTPUT PORTS INITIALIZE
LCD OFF
CLOCK OSC STOP
(BECAUSE OF STANDBY MODE.)
NO
IS ▶■■ KEY PRESSED? S906 CHECK (IC801 ㊺)
(CHECK IF STAND-BY IS RELEASED.)
YES
RAM CLEAR OSC ON
YES
TOP PANEL OPEN? S902 CHECK (IC801 64)
NO
YES
IS ■ KEY PRESSED? S801, 909 CHECK (IC801 66)
(CONFIRM IF POWER SWITCH IS ON OR OFF UNDER FRONT PANEL.)
NO
NO
IS ▶■■ KEY PRESSED? S906 CHECK (IC801 69)
YES
MICROCOMPUTER INITIAL SETTING
MAIN
①
①
MAIN
NO
INTERRUPT DETECTION FLAG = 1?
YES
INTERRUPT PROCESSING
INTERRUPT DETECTION FLAG CLEAR
EACH TIMER COUNTING
KEY INPUT DETECTION
ERROR DETECTION BY FOK, GFS
EACH JOB EXECUTION
DISPLAY DATA SET
NO
DISPLAY?
YES
CHECK INTERRUPT DETECTION FLAG?
YES
INTERRUPT DETECTION FLAG = 1?
NO
YES
NO
DISPLAY DATA TRANSMISSION
LCD BLANK RELEASE

Figure 1. Program Flow Chart

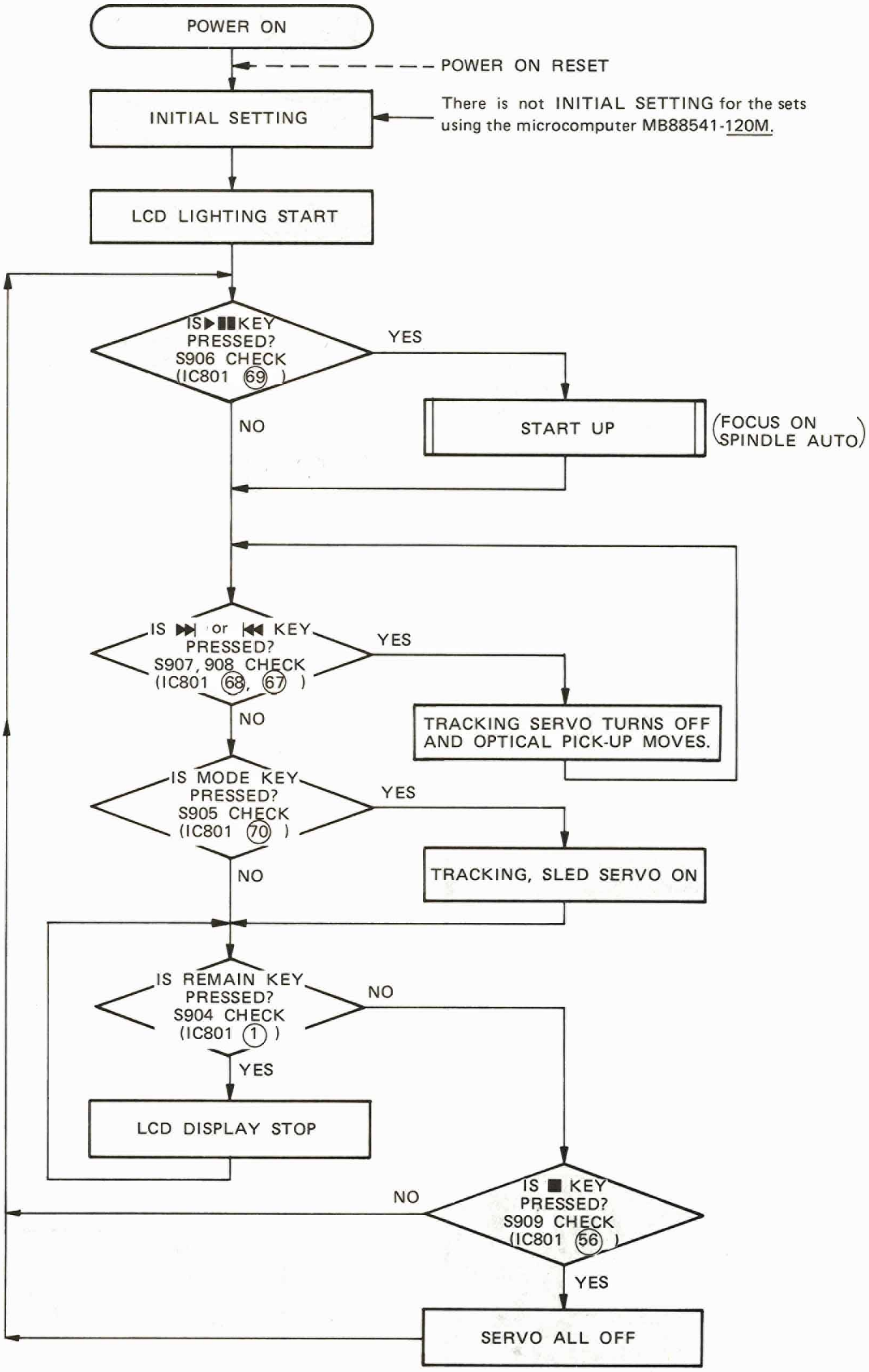

POWER ON
POWER ON RESET
INITIAL SETTING
There is not INITIAL SETTING for the sets using the microcomputer MB88541-120M.
LCD LIGHTING START
IS ▶❚❚ KEY PRESSED? S906 CHECK (IC801 ⑲)
YES
START UP
(FOCUS ON SPINDLE AUTO)
NO
IS ▶▶❘ or ❘◀◀ KEY PRESSED? S907, 908 CHECK (IC801 ⑱, ⑰)
YES
TRACKING SERVO TURNS OFF AND OPTICAL PICK-UP MOVES.
NO
IS MODE KEY PRESSED? S905 CHECK (IC801 ⑳)
YES
TRACKING, SLED SERVO ON
NO
IS REMAIN KEY PRESSED? S904 CHECK (IC801 ①)
NO
YES
LCD DISPLAY STOP
NO
IS ■ KEY PRESSED? S909 CHECK (IC801 (56))
YES
SERVO ALL OFF

Fig. 1-1 Service Program Flow Chart

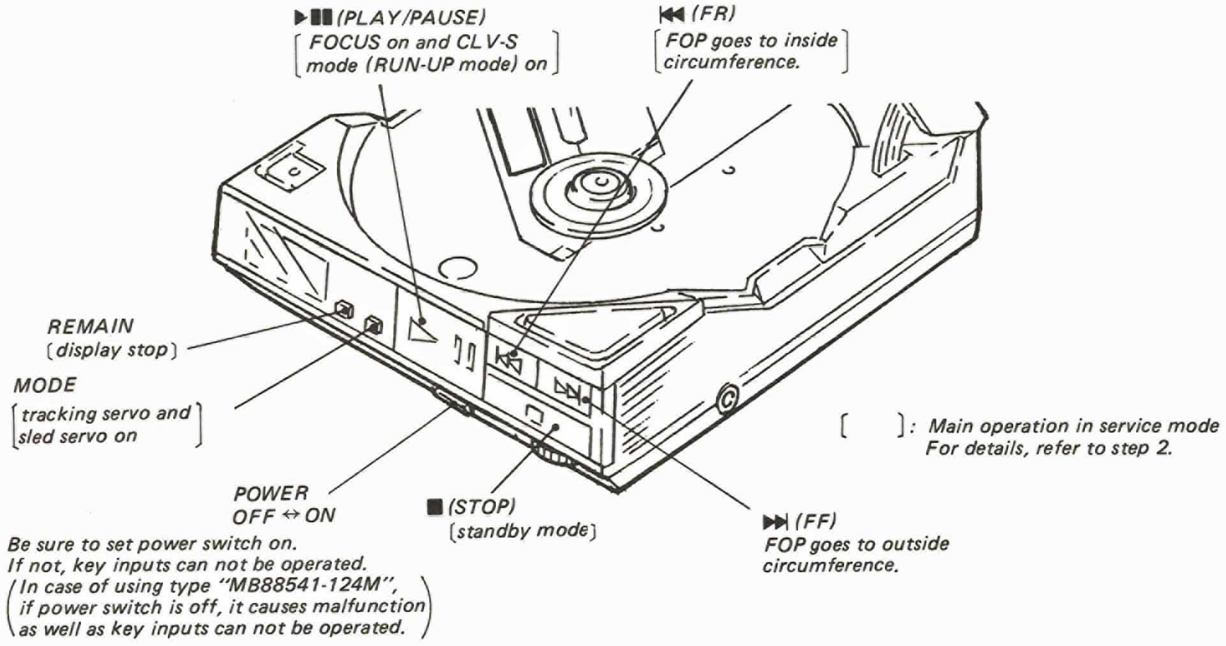

▶▮▮ (PLAY/PAUSE)
[FOCUS on and CLV-S mode (RUN-UP mode) on]
⏮ (FR)
[FOP goes to inside circumference.]
REMAIN
(display stop)
MODE
[tracking servo and sled servo on]
POWER
OFF ↔ ON
Be sure to set power switch on.
If not, key inputs can not be operated.
(In case of using type "MB88541-124M", if power switch is off, it causes malfunction as well as key inputs can not be operated.)
■ (STOP)
(standby mode)
⏭ (FF)
FOP goes to outside circumference.
[ ]: Main operation in service mode
For details, refer to step 2.

Fig. 2 Key Positions

Step 1 (Service Mode setting method)

1. Turn the power switch on with the external power supply not plugged in (no power applied to set) and press the ▶▮▮ key.
   (This is to discharge C803 connected to IC801 pin ⑧ ($\overline{\text{RESET}}$).)
2. Solder jumper BATT2 point.
   (IC801 pin (51) ($\overline{\text{BATT-E}}$) pin is grounded.)
3. Plug in external power supply.
   This puts the set into service mode.

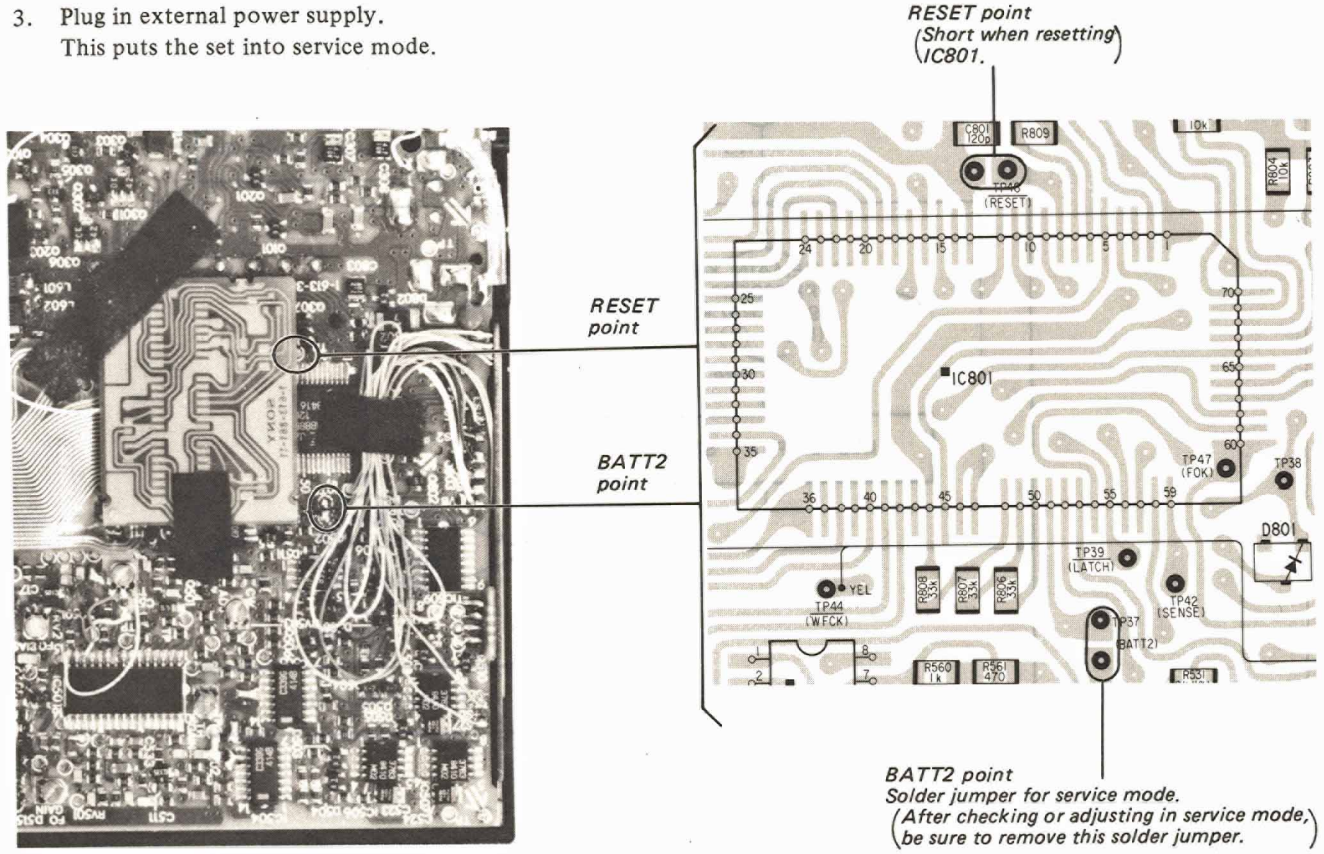

RESET point
(Short when resetting IC801.)
RESET point
BATT2 point
C801 120p
R809
R804 10k
10k
TP48 (RESET)
IC801
24
20
15
10
5
1
25
30
35
36
40
45
50
55
59
60
65
70
TP47 (FOK)
TP38
D801
TP39 (LATCH)
TP42 (SENSE)
TP37 (BATT2)
YEL
TP44 (WFCK)
R808 33k
R807 33k
R806 33k
R560 1k
R561 470
R531
BATT2 point
Solder jumper for service mode.
(After checking or adjusting in service mode, be sure to remove this solder jumper.)

Fig. 3 BATT2 point, RESET point Positions

Step 2 (Service Mode operation)

1. When service mode is set, the display will change 16 times, and those 16 changes will be repeated over and over.
   Note: Some sets using MB88541-120M for microcomputer IC801 will not perform LCD display.
   If this happens:
   1) Play a disc with the set in normal operation.
   2) In that state, solder jumper BATT2 point. (See Figure 3)
   3) Short the RESET point once and release. (See Figure 3)
   4) Plug in external power supply.

   With this the LCD display should be present in service mode. Even if LCD does not display, other operations will be performed.
2. When ■ key is pressed during each operation, it will return to the state in step 1.
3. When ⏭ or ⏮ key is pressed, the FOP moves to the inside or outside circumference. Tracking servo and sled servo go off when this is done, so press MODE to turn on the tracking servo if necessary.
4. When REMAIN is pressed, the display stops. When REMAIN is released, the display continues to change. This allows check of each segment.
5. When ▶▮▮ key is pressed, focus search starts, then CLV-S (run-up mode) starts. When there is no disc, focus search is repeated again and again.
   Note: When MB88541-120M is used for microcomputer IC801, the objective lens may remain up and the disc table may rotate at high speed when the ▶▮▮ key is pressed.
   (Sets using MB88541-120M for IC801 will set FOCUS ON FLAG after the focus on state has been obtained.)
   If this happens:
   1) Press ■ key.
   2) Unplug external power supply and press ▶▮▮ key.
   3) Plug in external power supply.
   4) Press ▶▮▮ key without disc inserted.

   With this, focus search will repeat over and over.
6. When MODE is pressed, tracking servo, sled servo and CLV-A (servo during PLAY) go ON.
7. When 5 and 6 are performed, the disc begins to play. At this time, the top panel should be closed and S901 and S902 are to be ON. When the laser is not emitted, focus search is repeated. When S901 is on and S902 is off, CLV-S does not work properly and the disc rotates at high speed.

Step 3 (Service Mode release)

1. First be sure to unplug the external power supply, then remove the BATT2 point solder jumper.
   (During service mode, C803 is discharged by unplugging the external power supply. Therefore, microcomputer IC801 is reset by next plugging in the external power supply.)
2. The set will now operate normally.

MAIN BOARD (double-sided) CHECK

1. The main board is double-sided, so there are parts mounted on both sides. However, checking can be done from the chip component mounted side. Refer to the mounting diagram on page 43 – 46.
2. D/A coverter IC's are mounted underneath the DC-DC converter unit, and these can be checked from the chip component mounted side.
   IC's under the DC-DC converter unit:
   IC301: D/A converter
   IC101, 201: integrator, sample hold
   IC302: switcher
3. When operating the set with the LCD module flexible board removed, the pattern corresponding to each key switch is to be grounded momentarily.

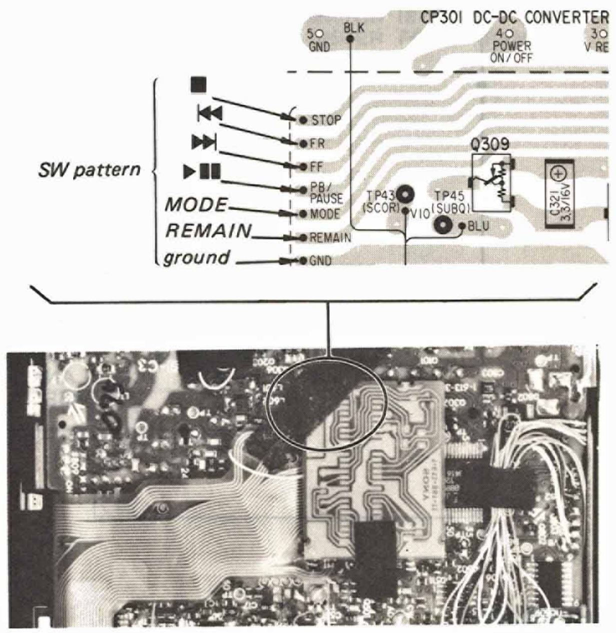

CP301 DC-DC CONVERTER
5 GND
BLK
4 POWER ON/OFF
3 V RE
SW pattern
■
⏮
⏭
▶▮▮
MODE
REMAIN
ground
STOP
FR
FF
PB/PAUSE
MODE
REMAIN
GND
TP43 (SCOR)
V10
TP45 (SUBQ)
BLU
Q309
C321 3.3/16V

Fig. 4 Switch Pattern Diagram

Laser Diode Check Procedure

The laser diode on this set will not emit unless the top panel is closed and S901 (terminal sorting type), S902 (leaf SW type) are turned on.
Focus search can be operated in service mode even if S902 is OFF, so that the laser diode will emit if S901 (terminal shorting type) are turned on in this mode.

The laser diode is checked using the current value which flows to the laser diode inside the FOP.
Procedure 1 (service mode or normal operation).

1. Close the top panel.
2. Connect an ammeter as shown in Figure 5.
3. Press the ▶▮▮ key.
4. Confirm that the ammeter reading is within the range given below.

   10–100 mA

   If not, APC circuit or FOP is defective.

   If normal operation is used, the laser diode goes on for about 3 seconds due to focus search.

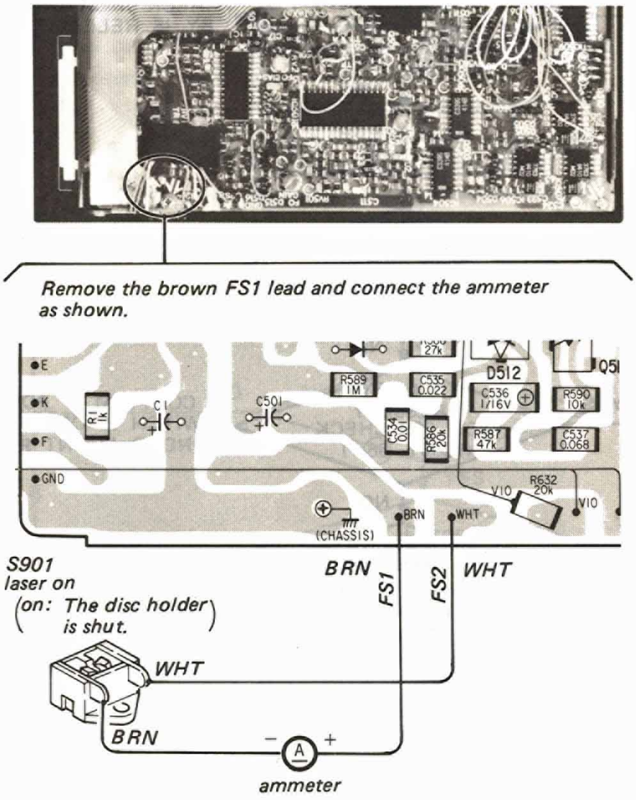
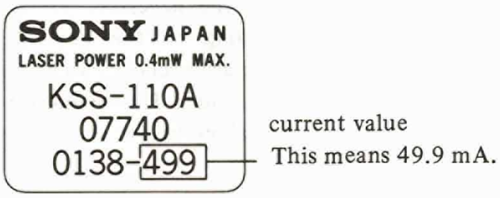

Remove the brown FS1 lead and connect the ammeter as shown.
E
K
F
GND
R1 1k
C1
C501
R589 1M
C535 0.022
C534 0.01
R586 20k
D512
C536 1/16V
R590 10k
R587 47k
C537 0.068
R632 20k
Q51
V10
V10
(CHASSIS)
BRN
WHT
S901
laser on
(on: The disc holder is shut.)
BRN
FS1
FS2
WHT
WHT
BRN
A
ammeter

Fig. 5 Ammeter Connection

Procedure 2 (service mode or normal operation).

1. Close the top panel.
2. Remove the main board and read the current value on the label affixed to the FOP.
   (Label on FOP)


SONY JAPAN
LASER POWER 0.4mW MAX.
KSS-110A
07740
0138-499

current value
This means 49.9 mA.

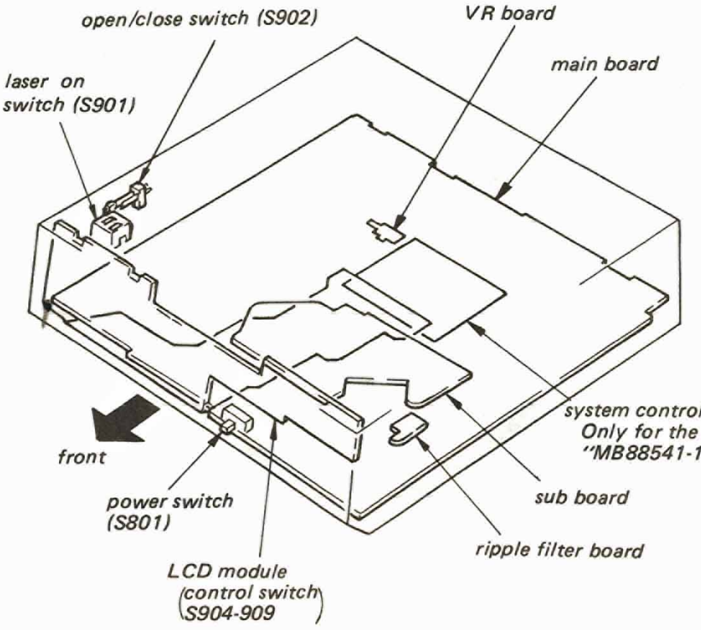
The current value varies with the set.

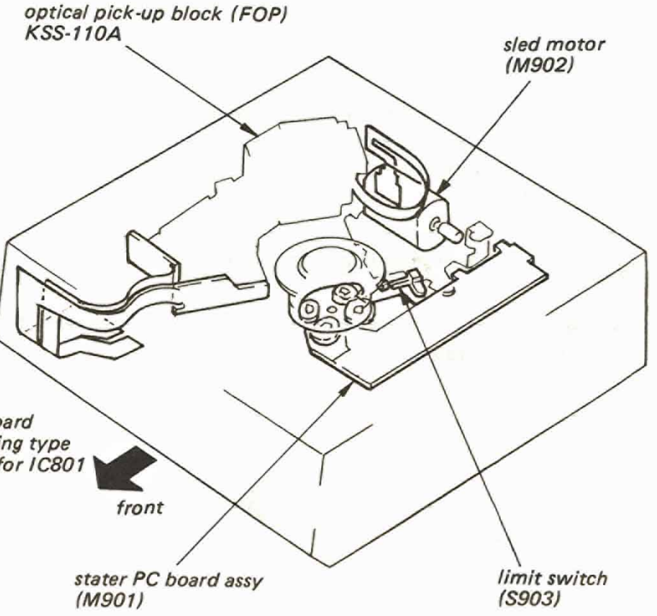
3. Mount the main board and connect an ammeter as shown in Figure 5.
4. Press the ▶▮▮ key.
5. Confirm that the ammeter reading is within the range given below.

   value on label $^{+11}_{-5}$ mA (25°C)
   variation relative to temperature:
   0.4 mA/°C
   (Current increases when temperature rises and decreases when it drops.)

   If the value is more than the range given, APC circuit has been defective or the laser diode has deteriorated. If it is less, APC circuit or FOP is defective.

PC BOARDS/SWITCH/MOTOR LAYOUTS

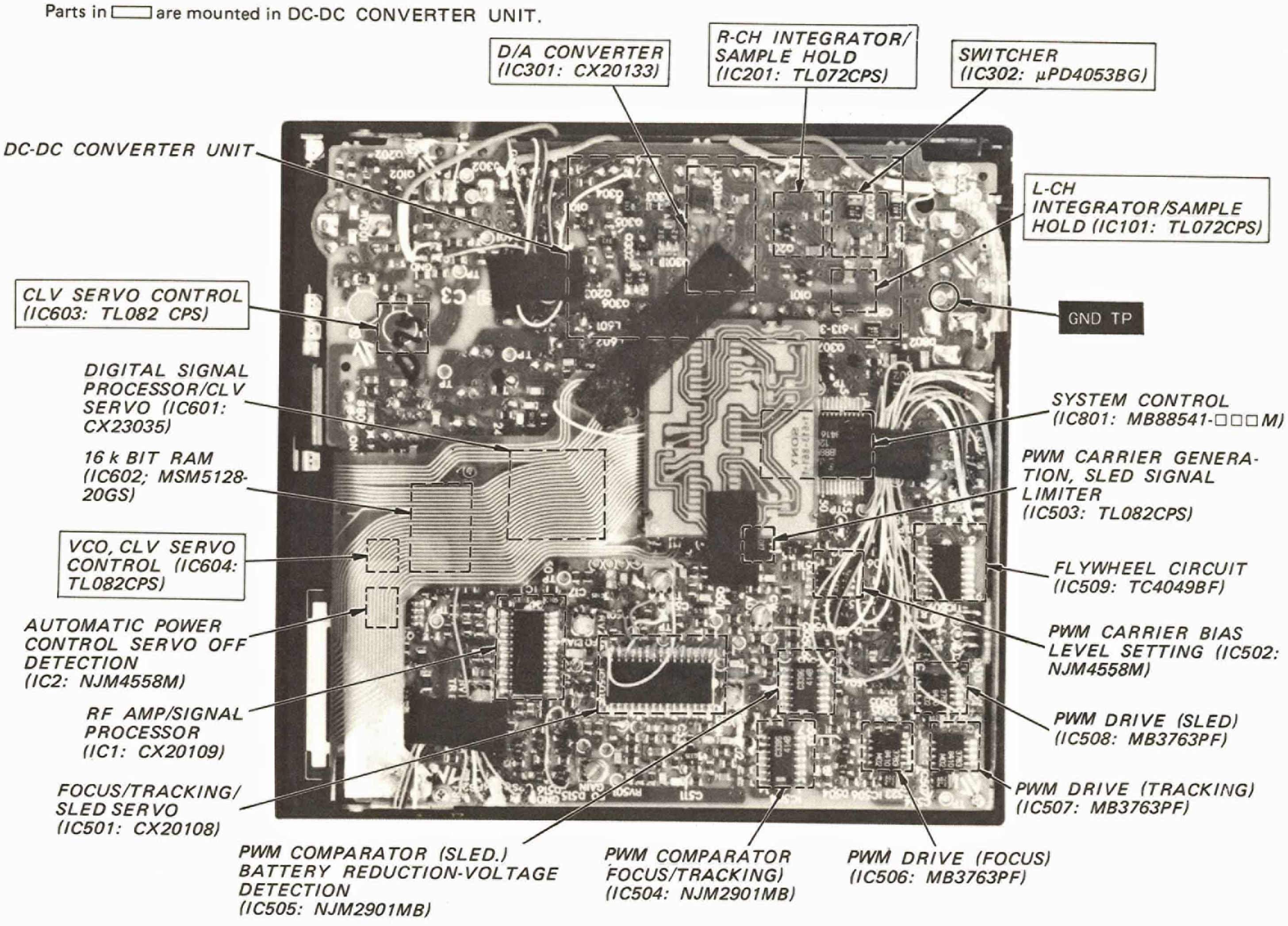

open/close switch (S902)
VR board
main board
laser on switch (S901)
front
power switch (S801)
LCD module (control switch S904-909)
system control sub board Only for the sets using type "MB88541-120M" for IC801
sub board
ripple filter board


optical pick-up block (FOP) KSS-110A
sled motor (M902)
front
stater PC board assy (M901)
limit switch (S903)

MAIN BOARD IC LAYOUTS

(Viewed from chip component mounted side)

Parts in ☐ are mounted in DC-DC CONVERTER UNIT.

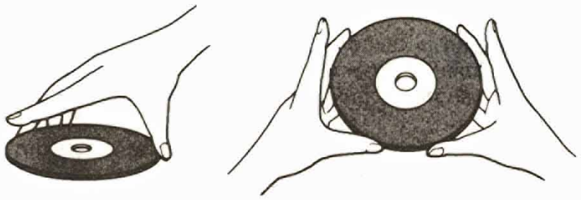

D/A CONVERTER (IC301: CX20133)
R-CH INTEGRATOR/ SAMPLE HOLD (IC201: TL072CPS)
SWITCHER (IC302: µPD4053BG)
DC-DC CONVERTER UNIT
L-CH INTEGRATOR/SAMPLE HOLD (IC101: TL072CPS)
CLV SERVO CONTROL (IC603: TL082 CPS)
GND TP
DIGITAL SIGNAL PROCESSOR/CLV SERVO (IC601: CX23035)
SYSTEM CONTROL (IC801: MB88541-□□□M)
16 k BIT RAM (IC602; MSM5128-20GS)
PWM CARRIER GENERATION, SLED SIGNAL LIMITER (IC503: TL082CPS)
VCO, CLV SERVO CONTROL (IC604: TL082CPS)
FLYWHEEL CIRCUIT (IC509: TC4049BF)
AUTOMATIC POWER CONTROL SERVO OFF DETECTION (IC2: NJM4558M)
PWM CARRIER BIAS LEVEL SETTING (IC502: NJM4558M)
RF AMP/SIGNAL PROCESSOR (IC1: CX20109)
PWM DRIVE (SLED) (IC508: MB3763PF)
FOCUS/TRACKING/ SLED SERVO (IC501: CX20108)
PWM DRIVE (TRACKING) (IC507: MB3763PF)
PWM COMPARATOR (SLED.) BATTERY REDUCTION-VOLTAGE DETECTION (IC505: NJM2901MB)
PWM COMPARATOR FOCUS/TRACKING) (IC504: NJM2901MB)
PWM DRIVE (FOCUS) (IC506: MB3763PF)

NOTES ON MOISTURE CONDENSATION

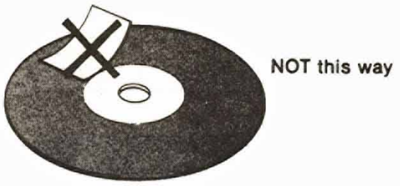
If the player is brought directly from a cold to a warm location, or is placed in a very damp room, moisture may condense on the lenses inside the unit.
Should this occur, the player will not operate. In this case, remove the disc and leave the player in a warm place for about an hour to evaporate the moisture.

NOTES ON COMPACT DISCS

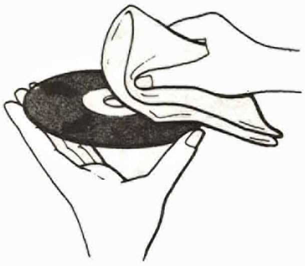
Handle the disc by its edge, and to keep the disc clean do not touch the rainbow colored surface.



Do not stick paper or tape or write anything on the labeled surface.



Do not expose the disc to direct sunlight or heat sources such as hot air ducts, or leave it in a car parked in direct sunlight where there can be a considerable rise in the temperature. Before playing, clean the disc with the optional cleaning cloth.
Wipe the disc in the direction of the arrows.



Do not use solvents such as benzine, thinner, commercially available cleaners or anti-static spray intended for analog discs.

After playing, store the disc in its case.

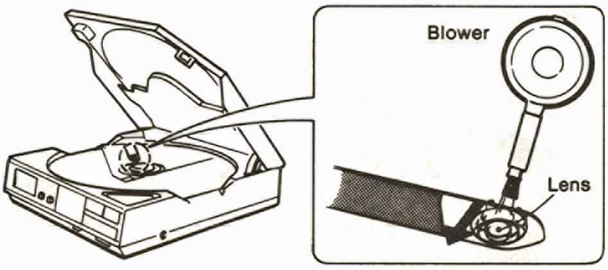
MAINTENANCE

CLEANING THE LENS

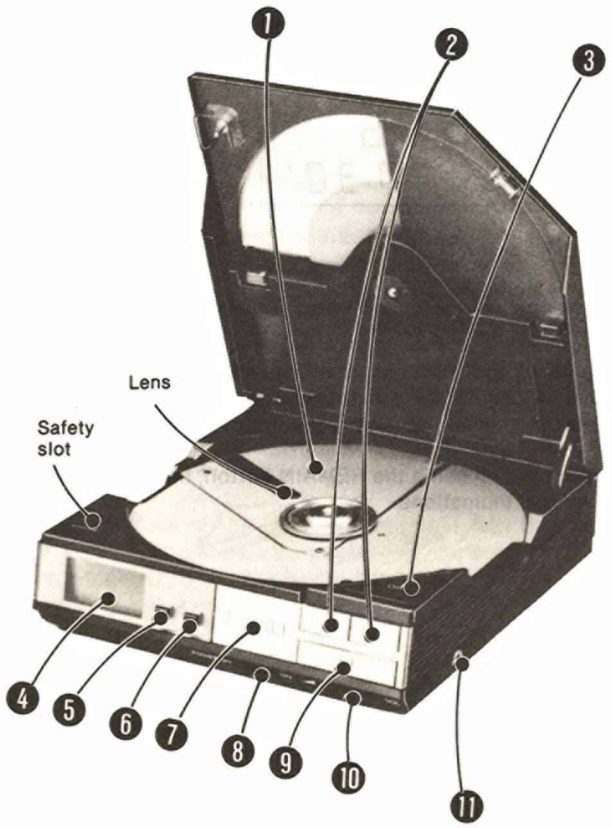
If you have accidentally touched the lens with a dirty finger or the dust on the lens prevents the set from operating properly, open the disc compartment lid with the OPEN button and clean the lens.

To remove dust

Blow on the lens a few times with a commercially available blower, brush the dust away in the direction of the arrow, then blow on the lens again.



LOCATION AND FUNCTION OF CONTROLS



FRONT

① Disc compartment
Place a compact disc here. To open the lid, press the OPEN button ③.

② AMS (Automatic Music Sensor) keys
While the AMS indicator ⑭ is being displayed, press the |◀◀ or ▶▶| key to locate the beginning of the desired selection. While the SEARCH indicator ⑮ is being displayed, keep the |◀◀ or ▶▶| key pressed to go back or advance to the desired point in a particular selection. During pause, you can go back or advance faster than during playback (See page 19).

③ OPEN button
Press to open the disc compartment lid.

④ Display window
See ⑫–⑯ on pages 17 and 18.

⑤ REMAIN button
While this button is being pressed, the TRACK indicator ⑬ will show the remaining number of selections on the disc and the TIME counter ⑯ will show the time remaining before the end of the last selection.
When you stop pressing the button, the display will return to the normal indications. (See page 20).

⑥ MODE button
Press to select either AMS function or SEARCH function. When play starts, the AMS indicator will appear on the dispaly window, indicating that the AMS function can be activated by pressing the |◀◀ or ▶▶| key. To select the SEARCH function, press this button. The SEARCH indicator will appear. Press the button again to return to the AMS function.

⑦ ▶ ❚❚ (play/pause) key
When the POWER switch ⑧ is set to ON, press this key once. The indications on the display window wil appear and play will start. Press again to stop the play for a moment. The TIME counter will flicker. To release the pause mode, press this key again. The TIME counter will return to the normal time indication and disc playing restarts.

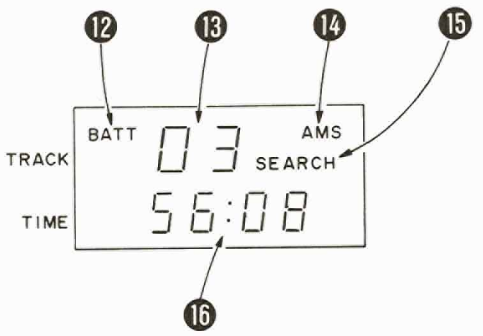
⑧ POWER switch
Set to ON to turn the power on. The player will stand by and disc playing will start simply by pressing the ▶ ❚❚ key.
Set to OFF after use and when transporting the unit so that the player will not operate even if any of the operation keys or buttons is pressed.

⑨ ■ (stop) key
Press to stop the disc playing. The indications on the display window will disappear after a few seconds and disc will stop rotating.

⑩ VOL (headphones volume) control
Turn to adjust the volume at the headphones connected to the ∩ jack ⑪. Before playing the disc turn down the volume completely. Turn to the right for more volume as you listen. Turn to the left for less volume.

⑪ ∩ (headphones) jack (stereo minijack)
Connect an optional pair of headphones for private listening.

Display window



⑫ BATT (battery) indicator
This indicator appears when disc playing starts. During battery operation, this indicator shows the battery condition. When the batteries are weak, the indicator flickers.

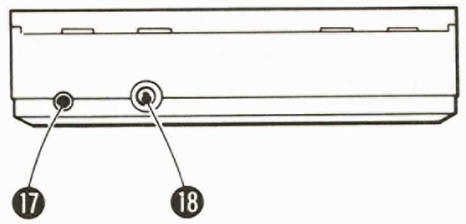
⑬ TRACK indicator
This indicator shows the track number of the selection being played.
While the REMAIN button is being pressed, the indicator shows the remaining number of selections on the disc.

⑭ AMS indicator
This indicator appears when disc playing starts. While this indicator is being displayed, you can locate the beginning of the desired selection by pressing either the |◀◀ or ▶▶| key.

⑮ SEARCH indicator
This indicator appears when the MODE button is pressed once during the playback or the pause mode. While this indicator is being displayed, if you press either |◀◀ or ▶▶| key, you can go back or advance to the desired point on the disc.

⑯ TIME counter
The counter shows the location in a particular selection by means of actual elapsed time. The first two digits of the counter show playing time of the selection in minutes, and the last two digits show the seconds.
While the REMAIN button is being pressed, the counter shows the time remaining before the end of the last selection on the disc. During pause, the time indication flickers.

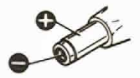
REAR PANEL



⑰ LINE OUT jack (stereo minijack)
This jack can be connected to the line input jacks of an amplifier when listening through a speaker system or of a tape recorder for recording.

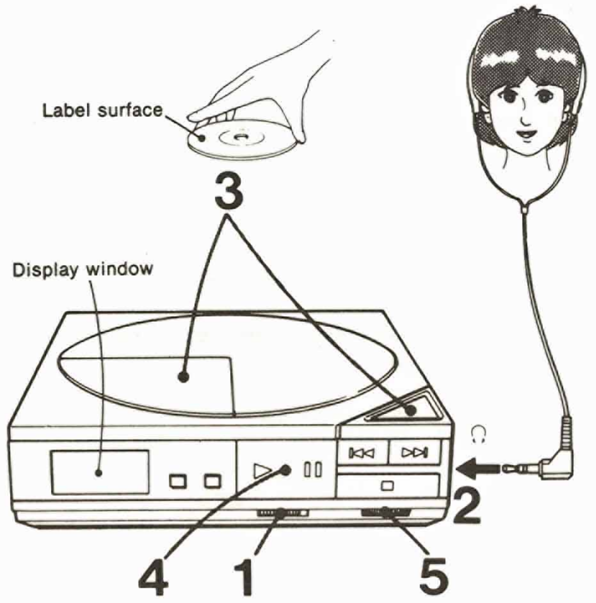
⑱ DC IN 9V (external power input) jack
Connect the supplied ac power adaptor, optional car battery cord or battery case.

Note: Use only an ac power adaptor or car battery cord manufactured by Sony. Polarity of the plugs of other manufacturers may be different.



Polarity of Sony plug

DISC PLAYING



1 Make sure that the POWER switch is set to ON.
2 Connect an optional pair of headphones to the ∩ jack.
3 Press the OPEN button to open the disc compartment lid. Holding the disc by the rim, place it with the label side up on the compartment, then close the lid.
4 Press the ▶ ❚❚ key. The indications on the display window will appear and play will begin from the beginning of the first selection.
5 Turn the VOL control to adjust the headphones volume.

When the player reaches the end of the last selection of the disc, the indications on the display window will disappear after a few seconds and the disc wil stop rotating.

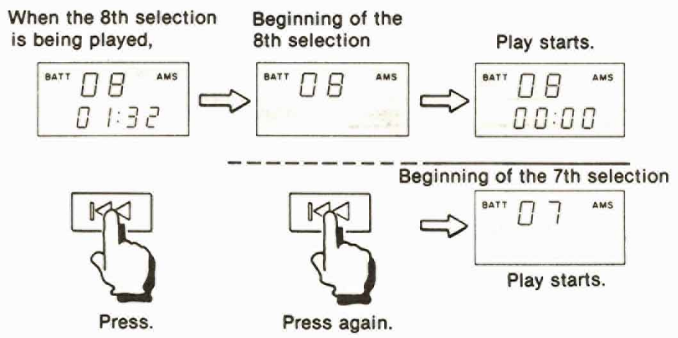
TO STOP DURING PLAY
Press the ■ key. The indications on the display window will disappear after a few seconds and the disc will stop rotating.
If you then press the ▶ ❚❚ key, play will start from the beginning of the first selection.
To take out the disc, open the disc compartment lid with the OPEN button.

TO PAUSE DURING PLAY
Press the ▶ ❚❚ key again. The TIME counter will flicker (The disc will not stop rotating).
To release pause mode and restart play from the same point, press the ▶ ❚❚ key again.

TO SEARCH FOR A PARTICULAR SELECTION—AMS (Automatic Music Sensor) function

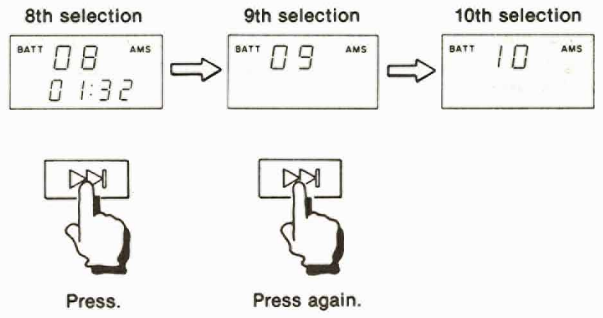
While the AMS indicator is being displayed during play or pause, you can quickly locate a selection before or after the selection playing. When either the |◀◀ or ▶▶| key is pressed during play, the player searches the selection data recorded at the beginning of each selection and play will start from the beginning of the desired selection. If either of the keys is pressed during pause, the player will wait in the pause mode at the beginning of the desired selection.
When the AMS indicator is not displayed, press the MODE button.

To search for a previous selection
Press the |◀◀ key during play or pause.
When the |◀◀ key is pressed once, the beinning of the selection being played is searched for.
When the key is continuously pressed, the selection before that will be searched for.


When the 8th selection is being played,
Beginning of the 8th selection
Play starts.
BATT 08 AMS 01:32
BATT 08 AMS
BATT 08 AMS 00:00
Beginning of the 7th selection
BATT 07 AMS
Play starts.
Press.
Press again.

Keep the |◀◀ key pressed until the desired selection number is displayed.
If you press the |◀◀ key after the first selection is located, the TRACK indicator will not change.

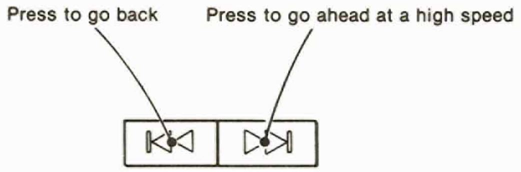
To search for a selection ahead
Press the ▶▶| key during play or pause.
When the ▶▶| key is pressed once, the selection after the one being played is searched for.
When the key is continuously pressed, the selection after that will be searched for.


8th selection
9th selection
10th selection
BATT 08 AMS 01:32
BATT 09 AMS
BATT 10 AMS
Press.
Press again.

If you press the ▶▶| key after the last selection is located, the TRACK indicator will not change.

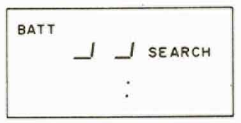
TO SEARCH FOR A PARTICULAR POINT IN A SELECTION—SEARCH function

During play or pause, press the MODE button so that the AMS indicator on the display window will disappear and the SEARCH indicator will appear instead.
While the SEARCH indicator is being displayed, you can locate a particular point in a selection.
When either |◀◀ or ▶▶| key is continuously pressed, the disc playing goes forward or in reverse. Release the button at the desired point found by observing the TIME counter or by monitoring the high-speed sound during play.

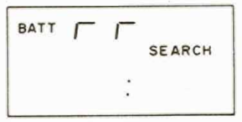

Press to go back
Press to go ahead at a high speed

If either |◀◀ or ▶▶| key is pressed when the set is in the pause mode, you can go back or ahead at a higher speed than during play-back.

What are these indications?


BATT
SEARCH

If you continuously press the ▶▶| key at the end of the disc, the TRACK indicator will change to "⌋⌋" (end mark). (During pause, the " : " mark will flicker.)
To return to a TRACK indication, press the |◀◀ key.

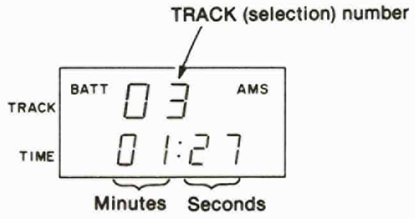

BATT
SEARCH

If you continuously press the |◀◀ key at the beginning of the disc, the TRACK indicator will change to "⌈⌈" (start mark). (During pause, the " : " mark will flicker.)
To return to a TRACK indication, press the ▶▶| key.

The "⌈⌈" mark also appears when the set is subject to strong vibration (it is not a problem). When this happens, make sure that the AMS indicator is displayed and press the ▶▶| key so that the display will return to normal indications.

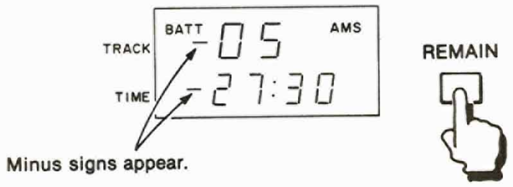
USING THE TIME COUNTER

TO MONITOR THE ELAPSED PLAYING TIME
Generally, the TIME counter shows the elapsed playing time from the beginning of the selection in minutes and seconds.
When a new selection starts, the counter is reset to "00:00" and then starts counting time again.
If the selection has a blank space at its beginning, the counter is reset to the time preceded by the minus sign such as "–00:02", "–00:01", etc.


TRACK (selection) number
TRACK
TIME
BATT 03 AMS
01:27
Minutes
Seconds

This indication shows that 1 minute 27 seconds have elapsed from the beginning of the third selection.

TO MONITOR THE REMAINING PLAYING TIME
When the REMAIN button is being pressed, the counter shows the remaining number of selections and the remaining time, each preceded by a minus sign, before the end of the last selection.

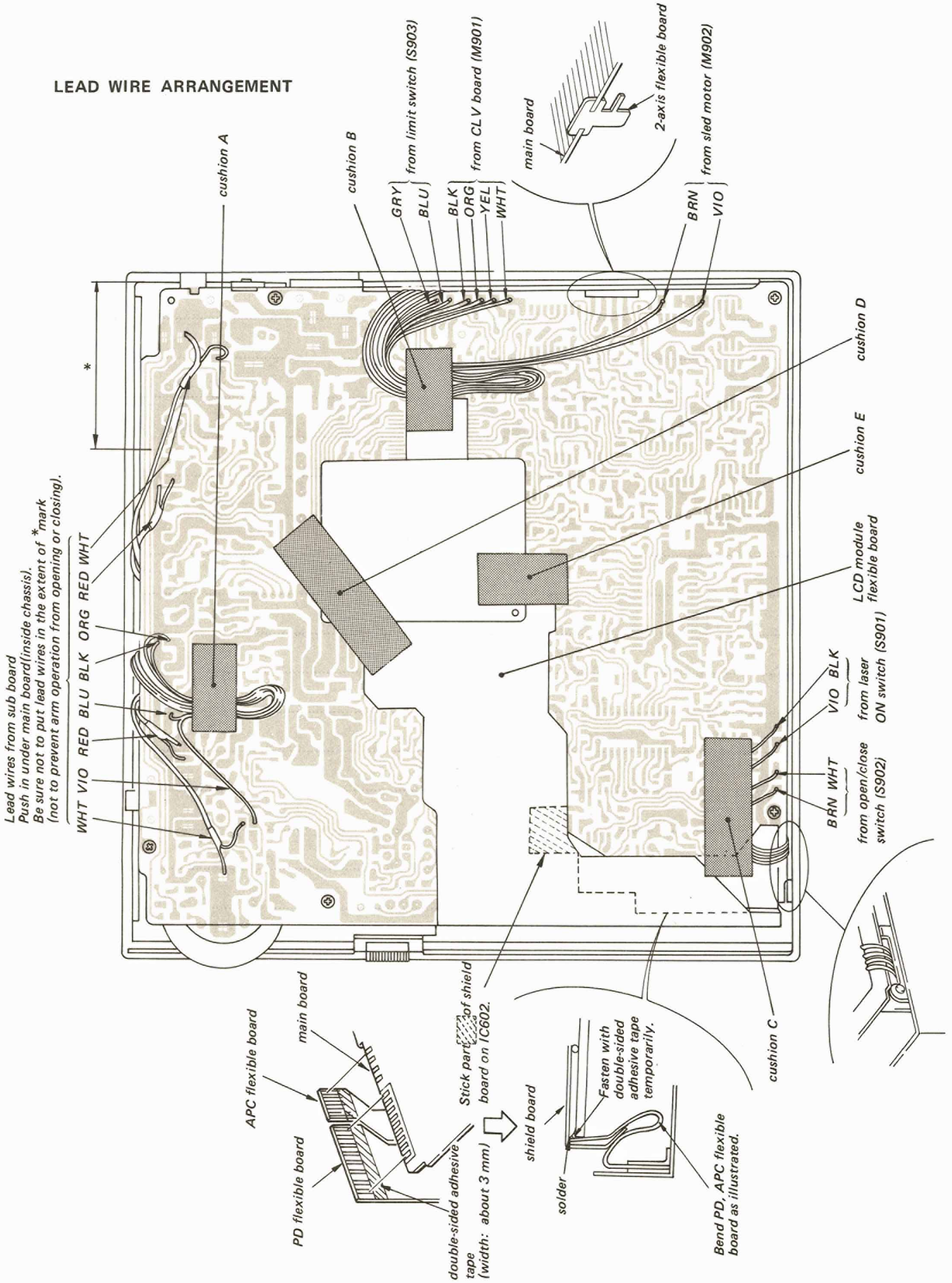

TRACK
TIME
BATT –05 AMS
–27:30
REMAIN
Minus signs appear.

This indication shows that 5 selections i.e. 27 minutes 30 seconds are remaining before the end of the disc.

The digits of the TIME counter will change, for example, from –27:30 to –27:29, –27:28... as the play goes on, and you can monitor the remaining playing time at any point of the disc.

When you stop pressing the REMAIN button, the display will return to the normal indications.

LEAD WIRE ARRANGEMENT


Lead wires from sub board
Push in under main board(inside chassis).
Be sure not to put lead wires in the extent of *mark
(not to prevent arm operation from opening or closing).
WHT VIO RED BLU BLK ORG RED WHT
*
cushion A
cushion B
GRY
BLU
from limit switch (S903)
BLK
ORG
YEL
WHT
from CLV board (M901)
main board
2-axis flexible board
BRN
VIO
from sled motor (M902)
cushion D
cushion E
LCD module flexible board
VIO BLK
from laser ON switch (S901)
BRN WHT
from open/close switch (S902)
cushion C
APC flexible board
main board
PD flexible board
double-sided adhesive tape (width: about 3 mm)
Stick part of shield board on IC602.
shield board
solder
Fasten with double-sided adhesive tape temporarily.
Bend PD, APC flexible board as illustrated.

MEMO

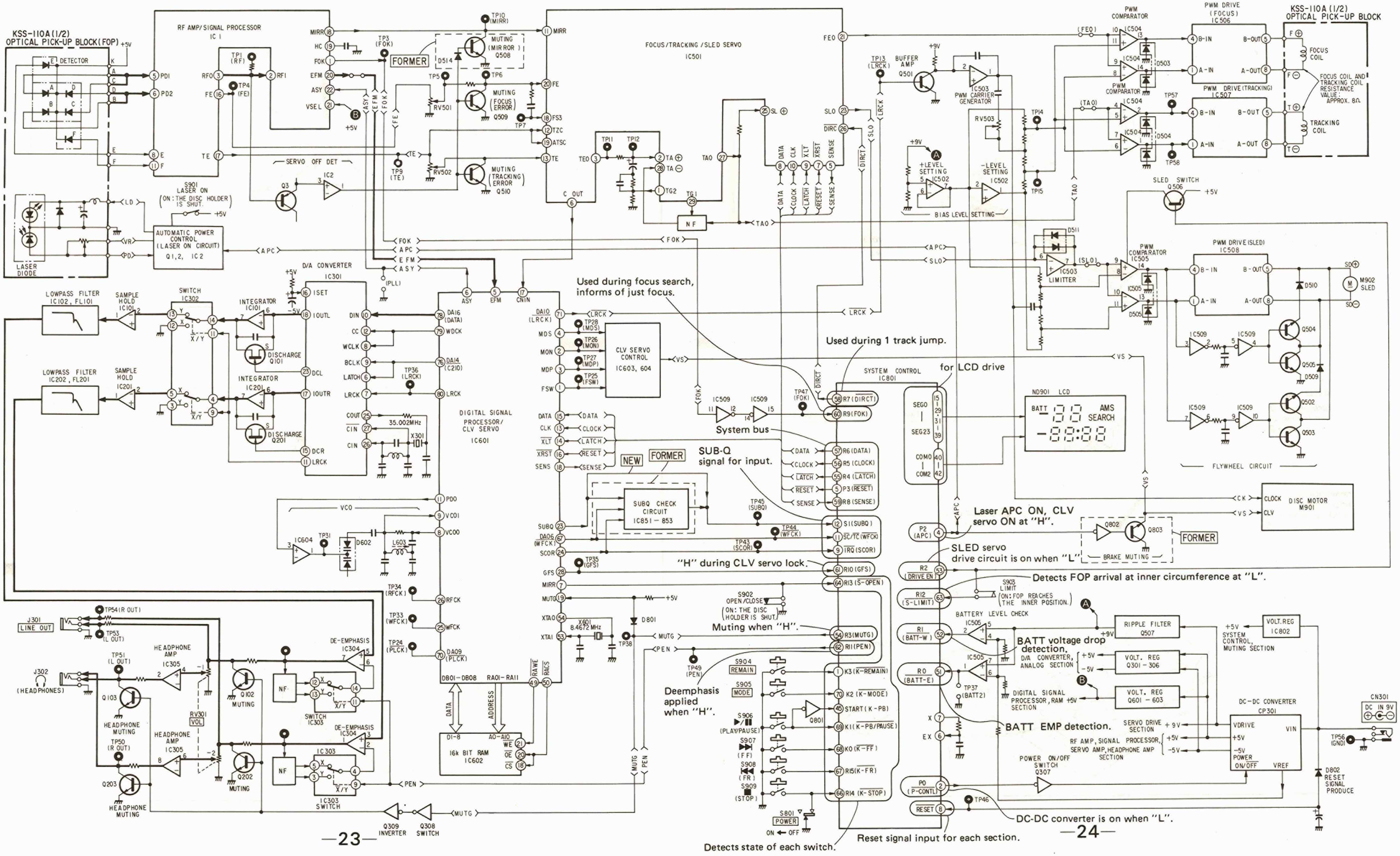
SECTION 1
OUTLINE

1-1. BLOCK DIAGRAM

Note:

A part of the circuit in this model differs depending on the microcomputer (Old: MB88541-120M, New: MB88541-124M) being used for IC801. These differences are indicated by "Old" and "New".

Old	shows the circuit of the set using type "MB88541-120M" for IC801 (D-5: up to serial No. 104,000).
New	shows the wiring of the set using type "MB88541-124M" for IC801 (D-5: serial No. 104,001 and later, D-50).

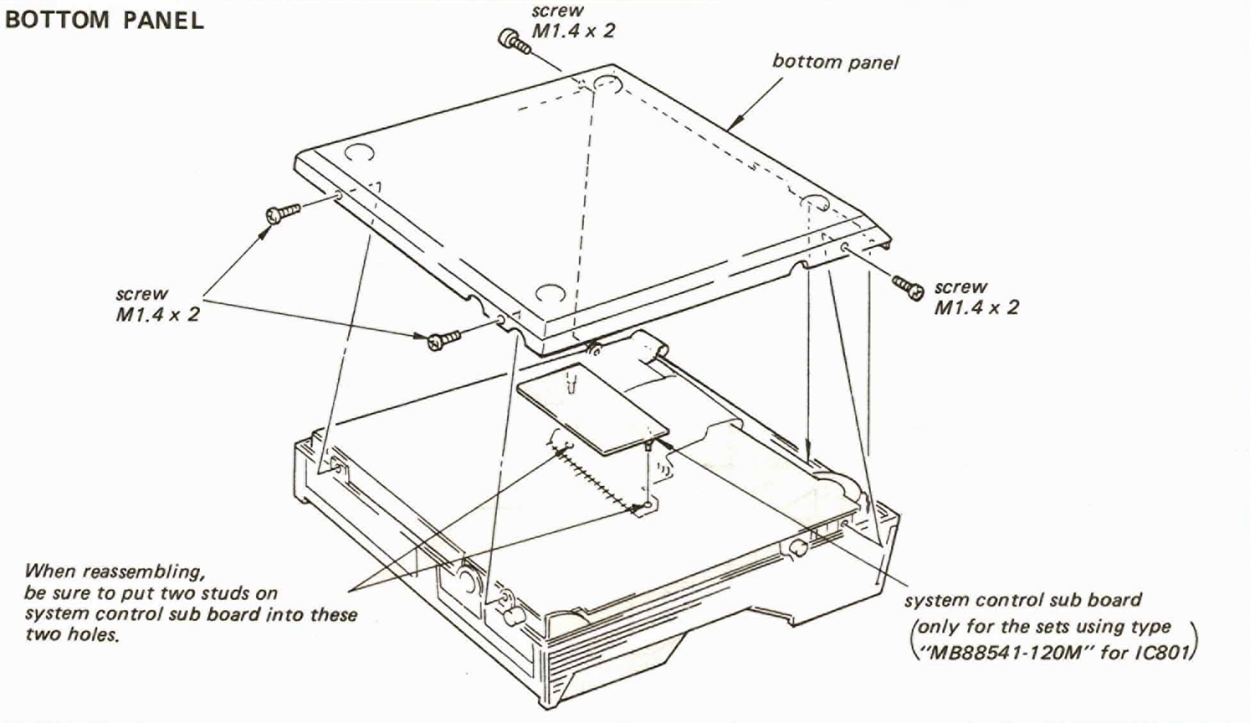

KSS-110A (1/2) OPTICAL PICK-UP BLOCK (FOP)
DETECTOR
LASER DIODE
RF AMP/SIGNAL PROCESSOR IC1
TP1 (RF)
TP4 (FE)
S901 LASER ON (ON: THE DISC HOLDER IS SHUT.)
AUTOMATIC POWER CONTROL (LASER ON CIRCUIT) Q1,2, IC2
SERVO OFF DET
TP10 (MIRR)
MUTING (MIRROR) Q508
FORMER
MUTING (FOCUS) ERROR Q509
MUTING (TRACKING) ERROR Q510
RV501
RV502
TP9 (TE)
FOCUS/TRACKING/SLED SERVO IC501
TP11
TP12
C OUT
NF
TP13 (LRCK)
BUFFER AMP Q501
IC503 PWM CARRIER GENERATOR
+LEVEL SETTING IC502
-LEVEL SETTING IC502
BIAS LEVEL SETTING
PWM COMPARATOR IC504
PWM DRIVE (FOCUS) IC506
PWM DRIVE (TRACKING) IC507
KSS-110A (1/2) OPTICAL PICK-UP BLOCK
FOCUS COIL
FOCUS COIL AND TRACKING COIL RESISTANCE VALUE: APPROX. 8Ω
TRACKING COIL
SLED SWITCH Q506
PWM COMPARATOR IC505
IC503 LIMITER
PWM DRIVE (SLED) IC508
M902 SLED
FLYWHEEL CIRCUIT
IC509
Q502 Q503 Q504 Q505
D/A CONVERTER IC301
LOWPASS FILTER IC102, FL101
LOWPASS FILTER IC202, FL201
SAMPLE HOLD IC101
SAMPLE HOLD IC201
SWITCH IC302
INTEGRATOR IC101
INTEGRATOR IC201
DISCHARGE Q101
DISCHARGE Q201
DIGITAL SIGNAL PROCESSOR/CLV SERVO IC601
CLV SERVO CONTROL IC603, 604
35.002MHz X301
VCO
IC604
16k BIT RAM IC602
8.4672MHz X601
Used during focus search, informs of just focus.
Used during 1 track jump.
SYSTEM CONTROL IC801
for LCD drive
ND901 LCD
BATT AMS SEARCH
System bus
SUB-Q signal for input.
NEW
FORMER
SUBQ CHECK CIRCUIT IC851 - 853
"H" during CLV servo lock.
Laser APC ON, CLV servo ON at "H".
Q802 Q803 BRAKE MUTING
SLED servo drive circuit is on when "L".
Detects FOP arrival at inner circumference at "L".
DISC MOTOR M901
S902 OPEN/CLOSE (ON: THE DISC HOLDER IS SHUT.)
Muting when "H".
S903 LIMIT (ON: FOP REACHES THE INNER POSITION.)
BATTERY LEVEL CHECK
BATT voltage drop detection.
RIPPLE FILTER Q507
VOLT. REG IC802
VOLT. REG Q301 - 306
VOLT. REG Q601 - 603
BATT EMP detection.
DC-DC CONVERTER CP301
CN301 DC IN 9V
D802 RESET SIGNAL PRODUCE
POWER ON/OFF SWITCH Q307
DC-DC converter is on when "L".
Reset signal input for each section.
Detects state of each switch.
S904 REMAIN
S905 MODE
S906 PLAY/PAUSE
S907 FF
S908 FR
S909 STOP
S801 POWER ON ← OFF
Deemphasis applied when "H".
J301 LINE OUT
J302 (HEADPHONES)
HEADPHONE AMP IC305
HEADPHONE MUTING
RV301 VOL
MUTING Q102 Q202
DE-EMPHASIS IC304
SWITCH IC303
Q309 INVERTER
Q308 SWITCH

SECTION 2
DISASSEMBLY AND REASSEMBLY

2-1. DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

BOTTOM PANEL

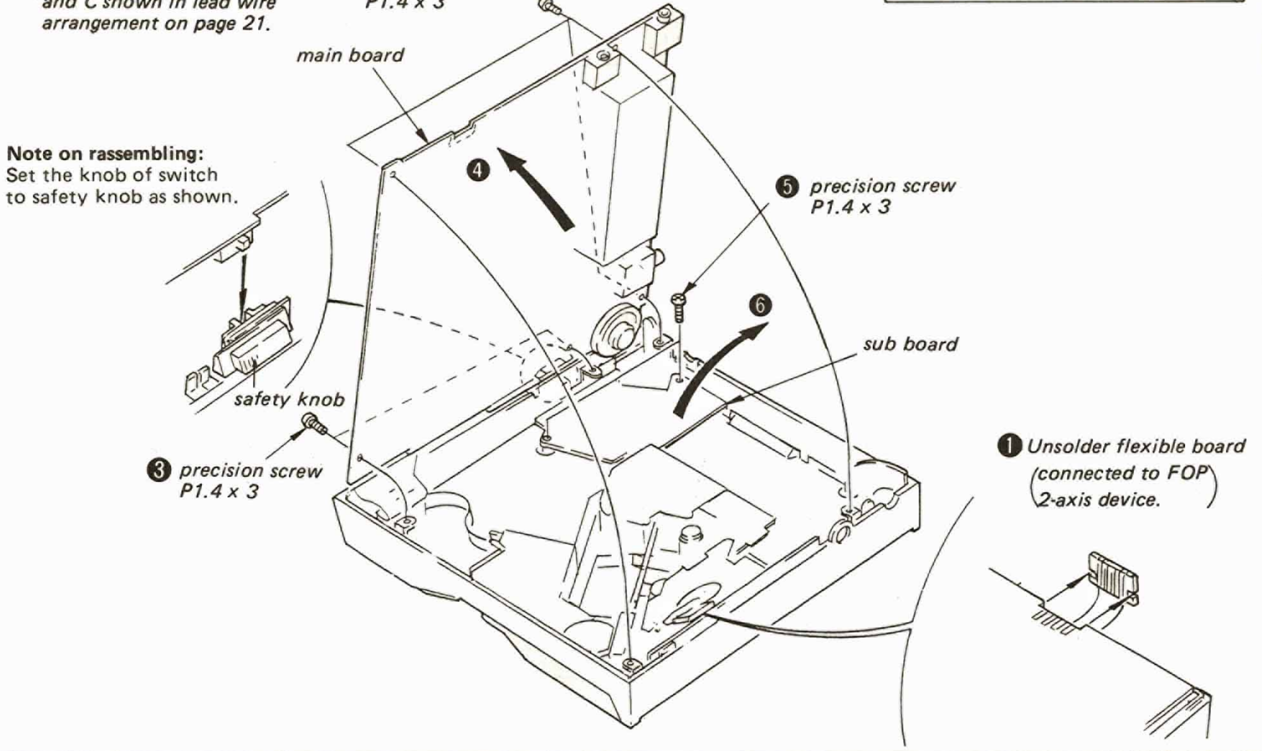

screw
M1.4 x 2
bottom panel
screw
M1.4 x 2
screw
M1.4 x 2
system control sub board
(only for the sets using type "MB88541-120M" for IC801)

When reassembling, be sure to put two studs on system control sub board into these two holes.

MAIN BOARD AND SUB BOARD

❷ *Remove cushions A, B and C shown in lead wire arrangement on page 21.*

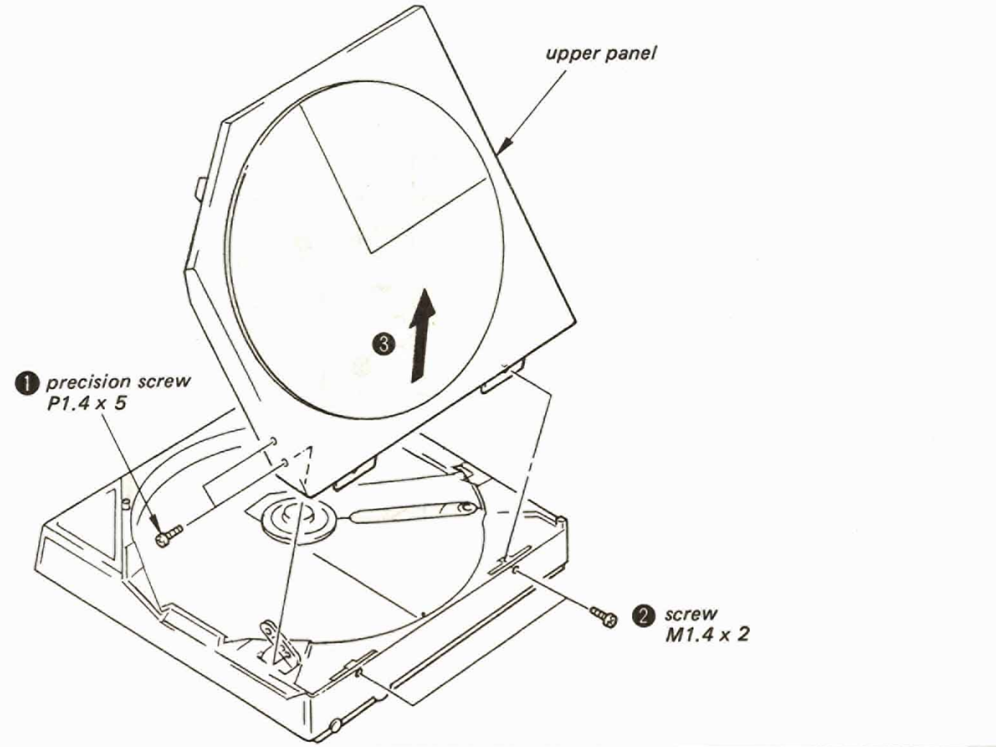
Note: Be careful not to break flexible board. (See page 7).


❸ precision screw
P1.4 x 3
main board
❹
❺ precision screw
P1.4 x 3
❻
sub board
safety knob
❸ precision screw
P1.4 x 3

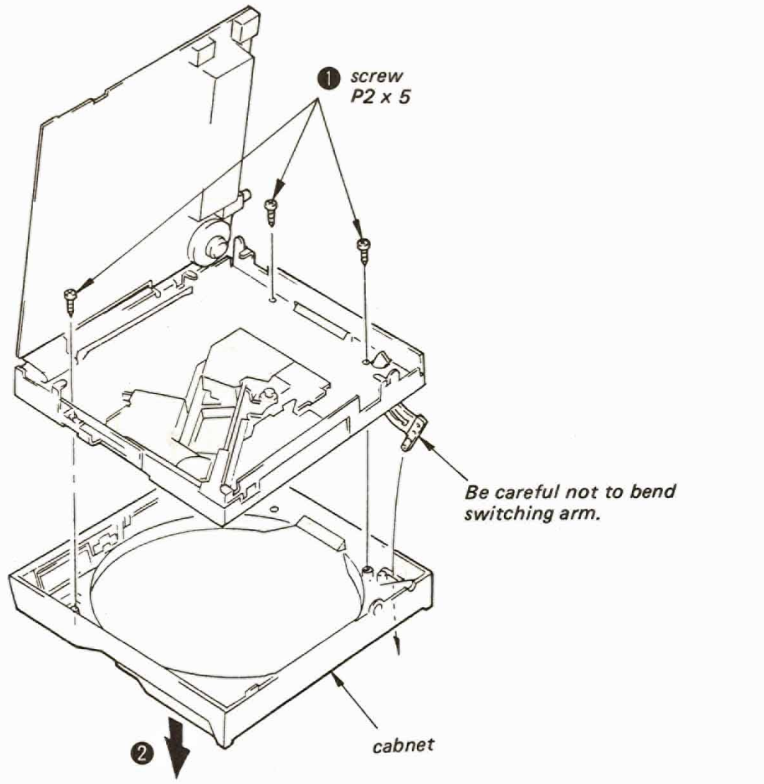
Note on rassembling:
Set the knob of switch to safety knob as shown.

❶ *Unsolder flexible board (connected to FOP 2-axis device.)*

UPPER PANEL

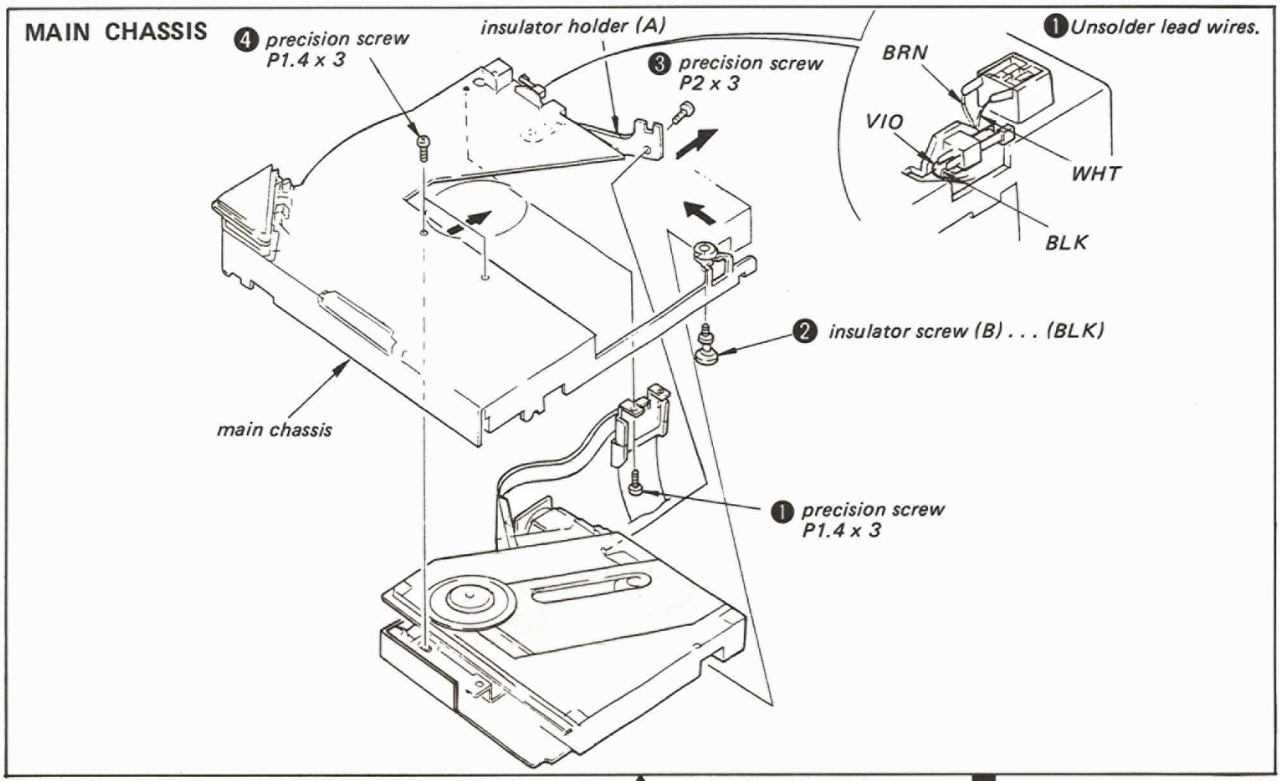

upper panel
❸
❶ precision screw
P1.4 x 5
❷ screw
M1.4 x 2

CABINET

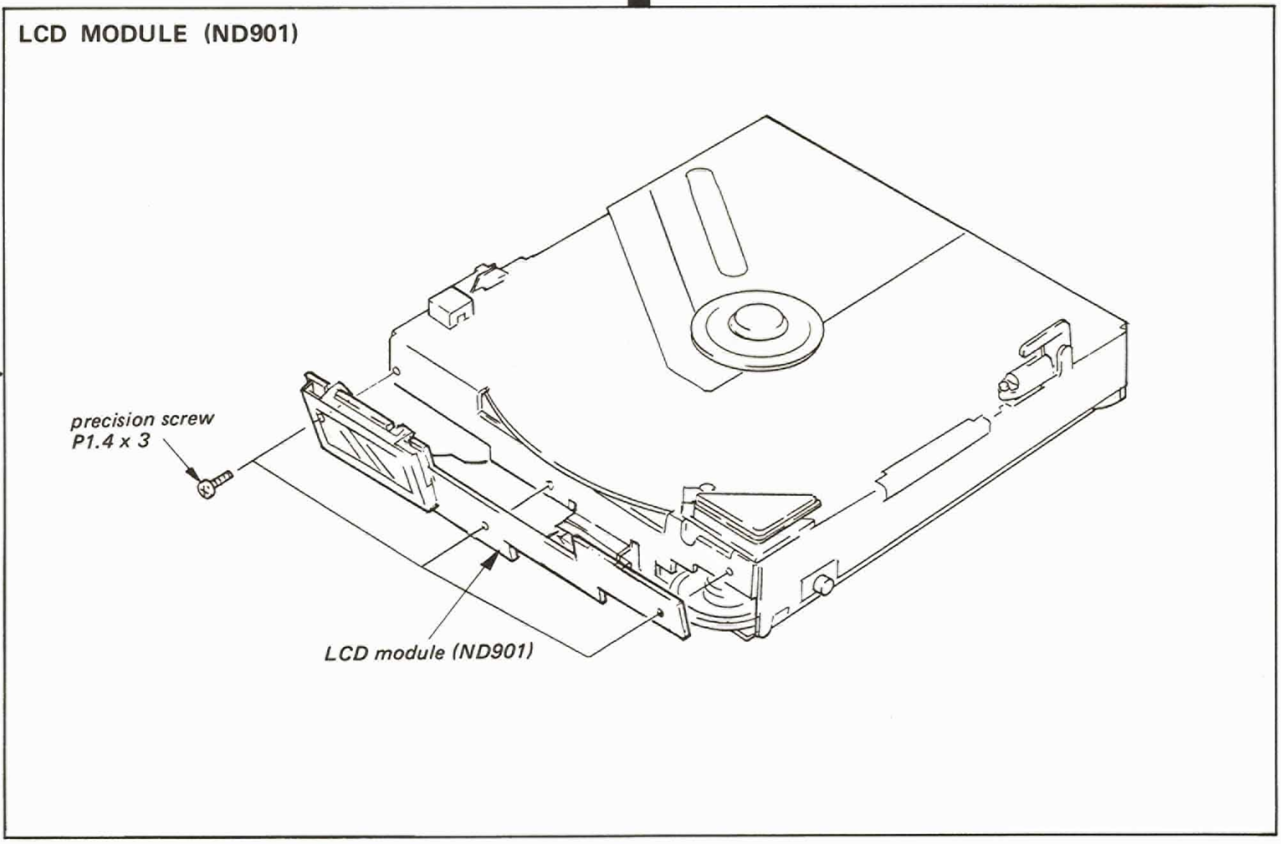

❶ screw
P2 x 5
cabnet
❷

Be careful not to bend switching arm.

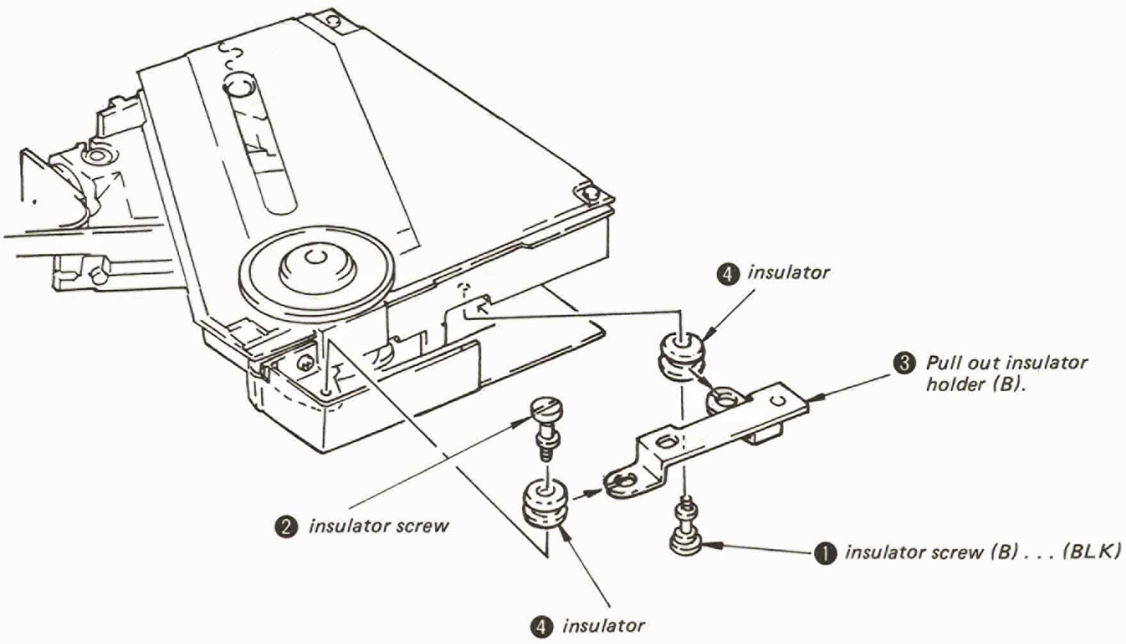
MAIN CHASSIS


❹ precision screw
P1.4 x 3
insulator holder (A)
❸ precision screw
P2 x 3
❶ Unsolder lead wires.
BRN
VIO
WHT
BLK
❷ insulator screw (B) . . . (BLK)
main chassis
❶ precision screw
P1.4 x 3

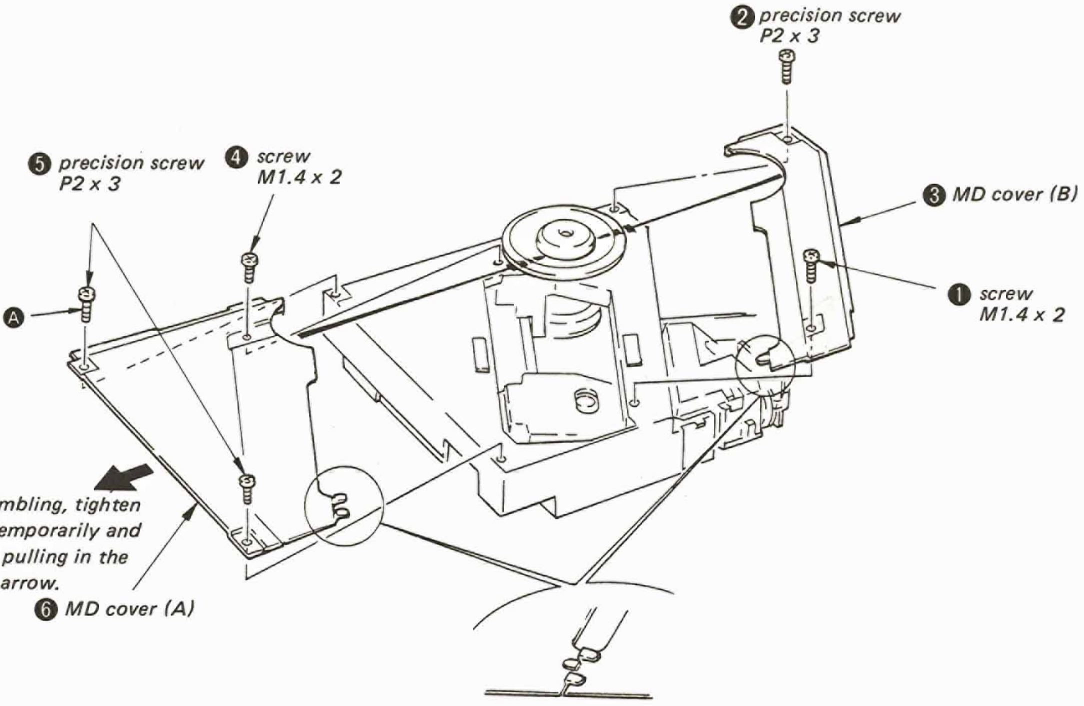
LCD MODULE (ND901)


precision screw
P1.4 x 3
LCD module (ND901)

INSULATOR


❹ insulator
❸ Pull out insulator holder (B).
❷ insulator screw
❶ insulator screw (B) . . . (BLK)
❹ insulator

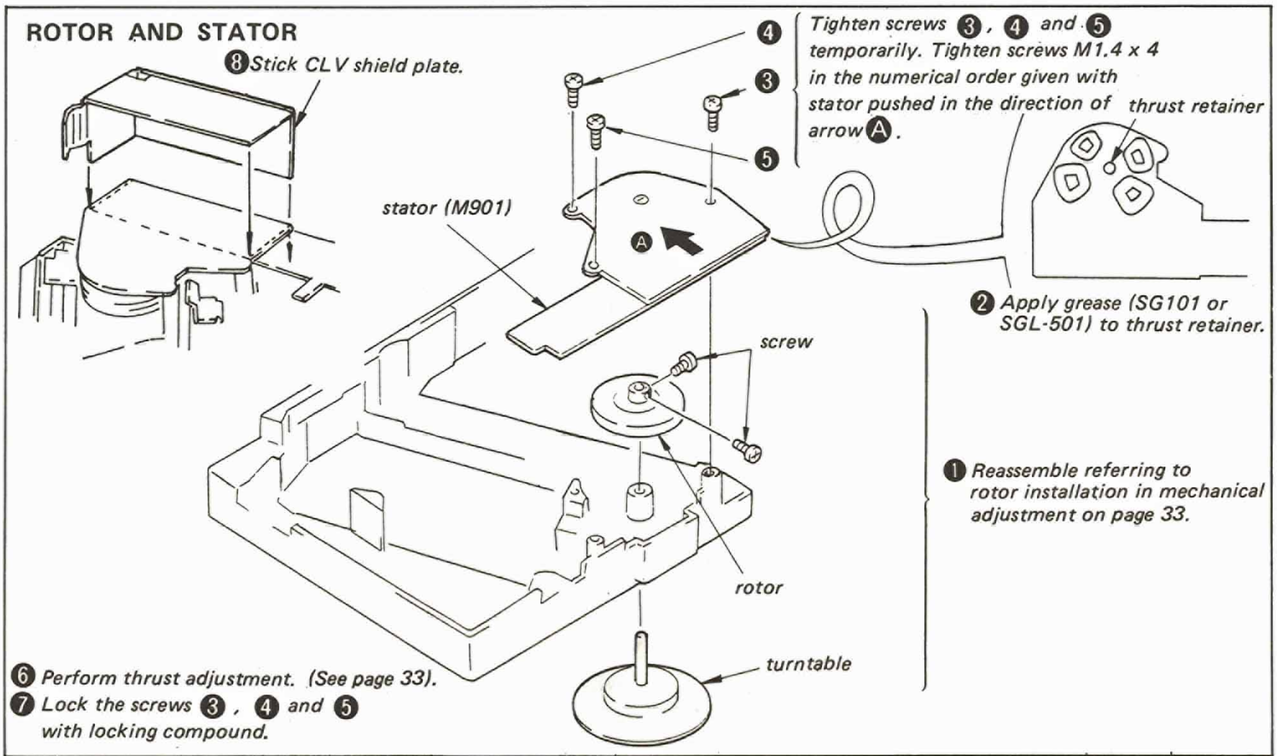
MD COVER


❷ precision screw P2 x 3
❺ precision screw P2 x 3
❹ screw M1.4 x 2
❸ MD cover (B)
Ⓐ
❶ screw M1.4 x 2
❻ MD cover (A)

When reassembling, tighten screw Ⓐ temporarily and install while pulling in the direction of arrow.

2-2. MECHANICAL SECTION REASSEMBLY

ROTOR AND STATOR



⑧ Stick CLV shield plate.

Tighten screws ③, ④ and ⑤ temporarily. Tighten screws M1.4 x 4 in the numerical order given with stator pushed in the direction of arrow Ⓐ.

② Apply grease (SG101 or SGL-501) to thrust retainer.

① Reassemble referring to rotor installation in mechanical adjustment on page 33.

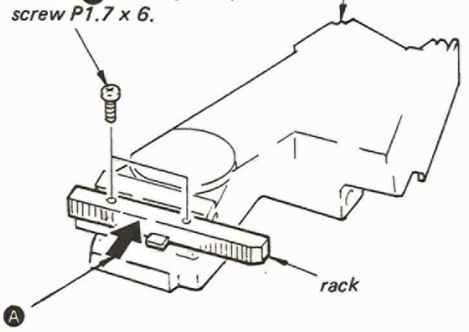
⑥ Perform thrust adjustment. (See page 33).

⑦ Lock the screws ③, ④ and ⑤ with locking compound.

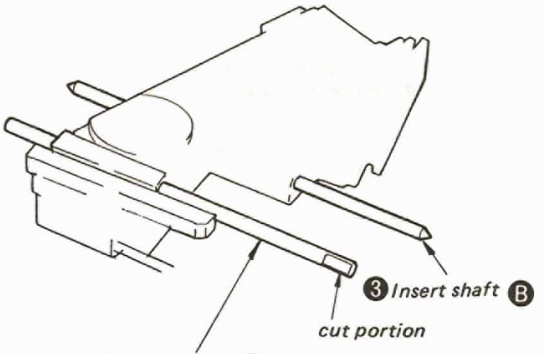
RACK AND SHAFT A, B

optical pick-up block (FOP)

① Push the rack in the direction of arrow Ⓐ and tighten precision screw P1.7 x 6.



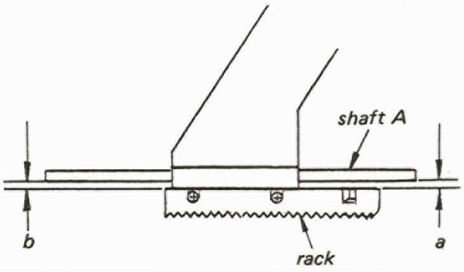
(Push center portion of rack between two screws at a right angle against rack.)



③ Insert shaft Ⓑ

② Insert shaft Ⓐ.
(Be careful not to insert it from tip with cut portion.)

④ Confirm that a = b. If not, perform again from ①

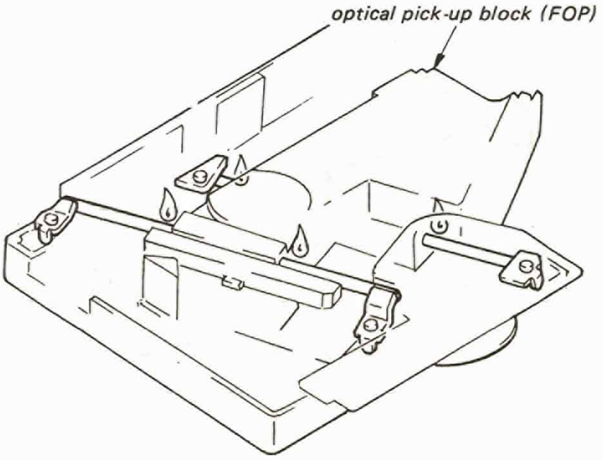


Refer to NOTES ON HANDLING THE OPTICAL PICK-UP BLOCK (KSS-110A) on page 4.

Refer to NOTES ON HANDLING THE OPTICAL PICK-UP BLOCK (KSS-110A) on page 4.

OIL SUPPLY OF SHAFTS A, B

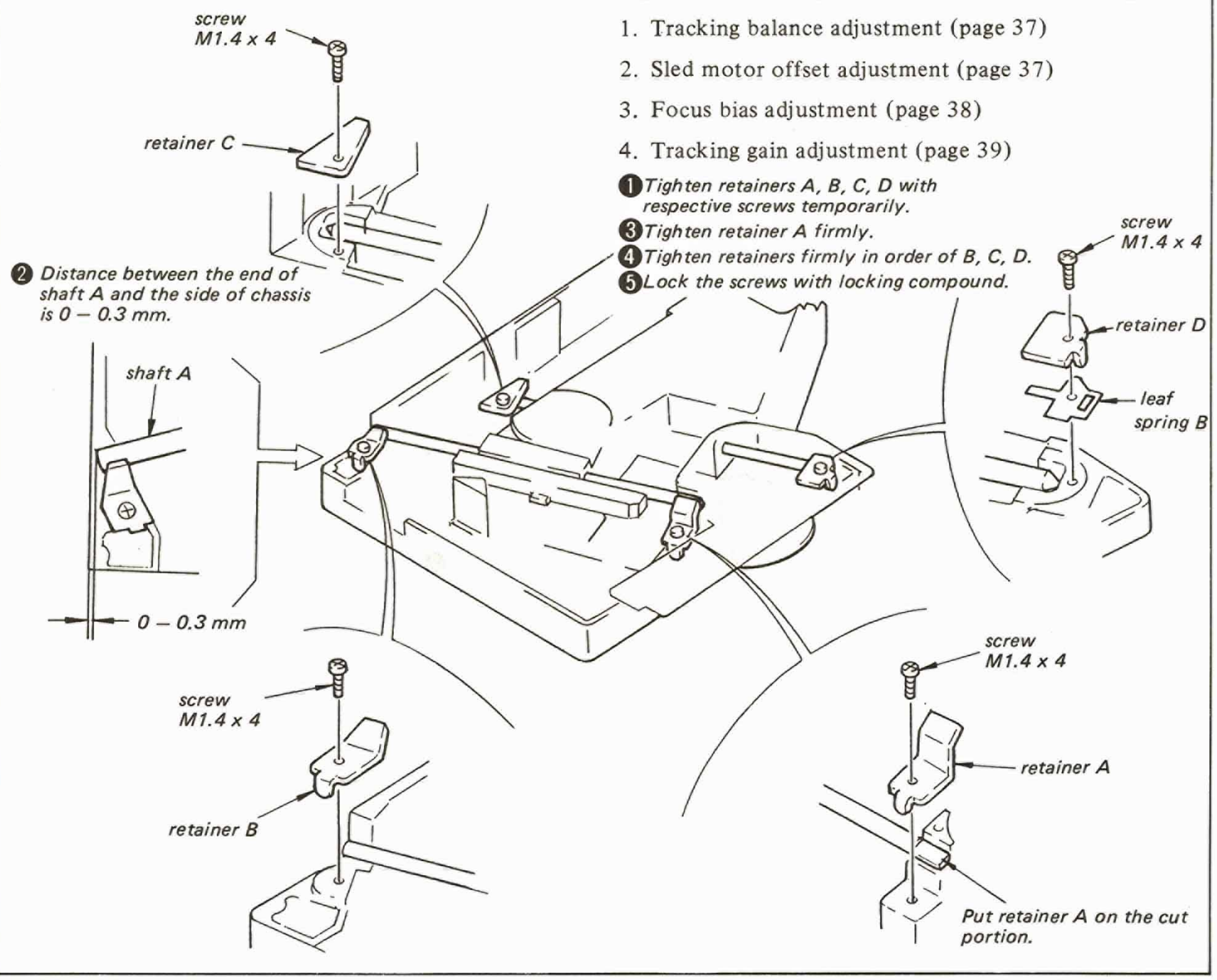
❶ *Apply a drop of hydro fluid EP-56 (part no. 7-661-018-01) to four portions marked 💧 .*
❷ *Move FOP right and left two or three times to smooth them.*
❸ *Lift up mechanical section and incline it in the right or left direction. Confirm that FOP is moved smoothly with itself-weight.*


optical pick-up block (FOP)

OPTICAL PICK-UP BLOCK

When replacing optical pick-up block, confirm and adjust the following items in the numerical order given.

1. Tracking balance adjustment (page 37)
2. Sled motor offset adjustment (page 37)
3. Focus bias adjustment (page 38)
4. Tracking gain adjustment (page 39)

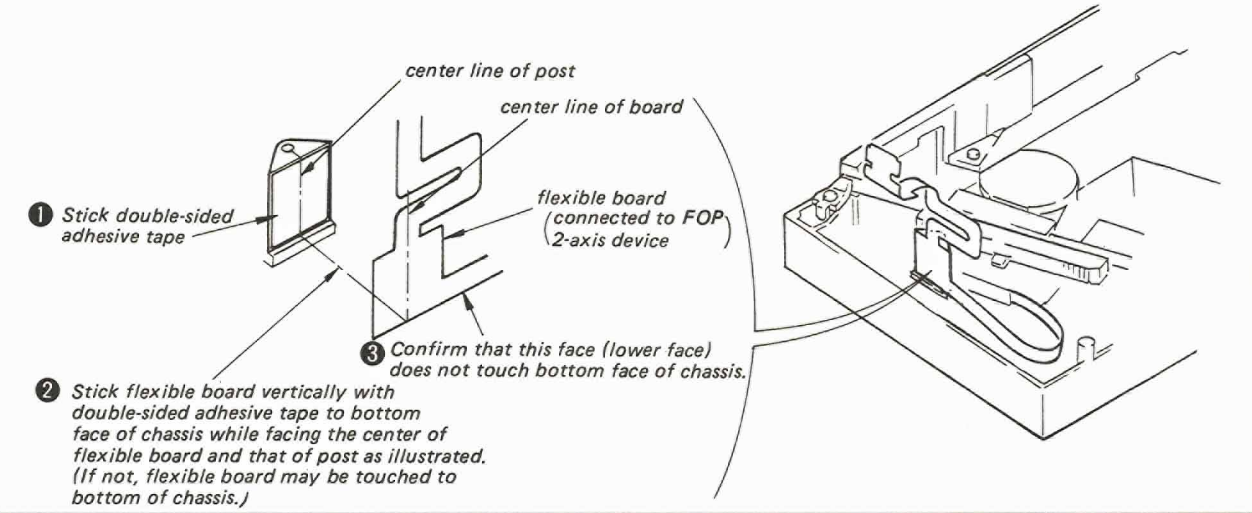

❶ *Tighten retainers A, B, C, D with respective screws temporarily.*
❷ *Distance between the end of shaft A and the side of chassis is 0 – 0.3 mm.*
❸ *Tighten retainer A firmly.*
❹ *Tighten retainers firmly in order of B, C, D.*
❺ *Lock the screws with locking compound.*

Put retainer A on the cut portion.

screw M1.4 x 4
retainer C
shaft A
0 – 0.3 mm
screw M1.4 x 4
retainer B
screw M1.4 x 4
retainer D
leaf spring B
screw M1.4 x 4
retainer A

Refer to NOTES ON HANDLING THE OPTICAL PICK-UP BLOCK (KSS-110A) on page 4.

ATTACHMENT OF FLEXIBLE BOARD


center line of post
center line of board
flexible board (connected to FOP 2-axis device)

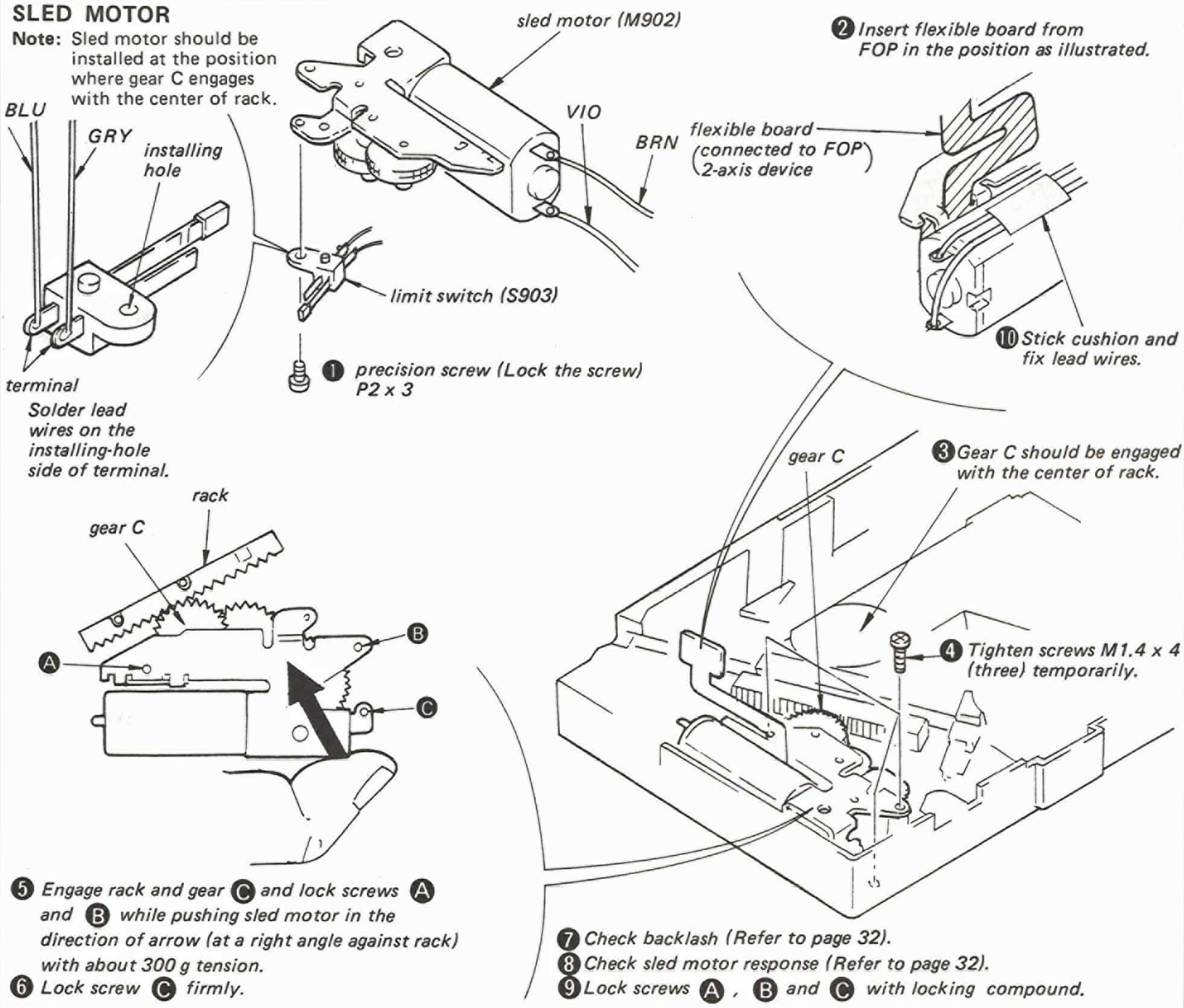
❶ Stick double-sided adhesive tape

❷ Stick flexible board vertically with double-sided adhesive tape to bottom face of chassis while facing the center of flexible board and that of post as illustrated. (If not, flexible board may be touched to bottom of chassis.)

❸ Confirm that this face (lower face) does not touch bottom face of chassis.

SLED MOTOR

Note: Sled motor should be installed at the position where gear C engages with the center of rack.


sled motor (M902)
BLU
GRY
installing hole
VIO
BRN
flexible board (connected to FOP 2-axis device)
limit switch (S903)
terminal
rack
gear C
Ⓐ
Ⓑ
Ⓒ
gear C

Solder lead wires on the installing-hole side of terminal.

❶ precision screw (Lock the screw) P2 x 3

❷ Insert flexible board from FOP in the position as illustrated.

❸ Gear C should be engaged with the center of rack.

❹ Tighten screws M1.4 x 4 (three) temporarily.

❺ Engage rack and gear Ⓒ and lock screws Ⓐ and Ⓑ while pushing sled motor in the direction of arrow (at a right angle against rack) with about 300 g tension.

❻ Lock screw Ⓒ firmly.

❼ Check backlash (Refer to page 32).

❽ Check sled motor response (Refer to page 32).

❾ Lock screws Ⓐ, Ⓑ and Ⓒ with locking compound.

❿ Stick cushion and fix lead wires.

2-3. MECHANICAL ADJUSTMENTS

Backlash Check

Measuring Locations:

Outer circumference: Where dimension A in the figure at right (space between FOP and press plate B) is 3-5 mm.

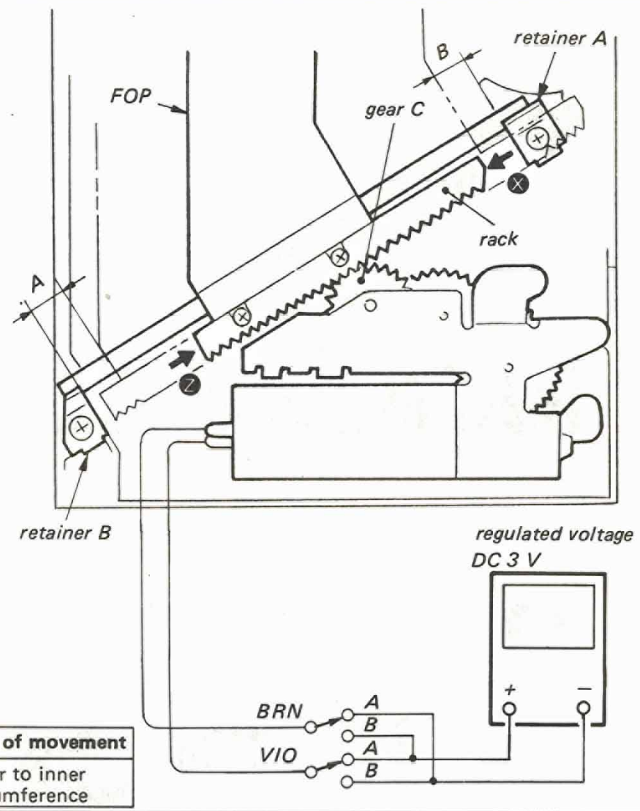
Middle: Location where gear C engagement point is at the center of the rack.

Inner circumference: Where dimension B at right (space between FOP and retainer A) is 3-5 mm.

Measuring Procedure:

1. Apply 3 V to sled motor lead and move the FOP to the measuring location.(Refer to figure).
2. At each measuring location, check that there is no movement in the directions of the arrows marked Ⓧ and Ⓩ when 50 g is applied to a fan-shaped tension gauge.
3. If there is movement, sled motor mounting should be redone. (Refer to page 31, Sled Motor Assembly.)

Switch position	Direction of movement	Switch position	Direction of movement
side A	inner to outer circumference	side B	outer to inner circumference


retainer A
B
gear C
FOP
Ⓧ
rack
A
Ⓩ
retainer B
regulated voltage DC 3 V
+
−
BRN
VIO
A
B
A
B

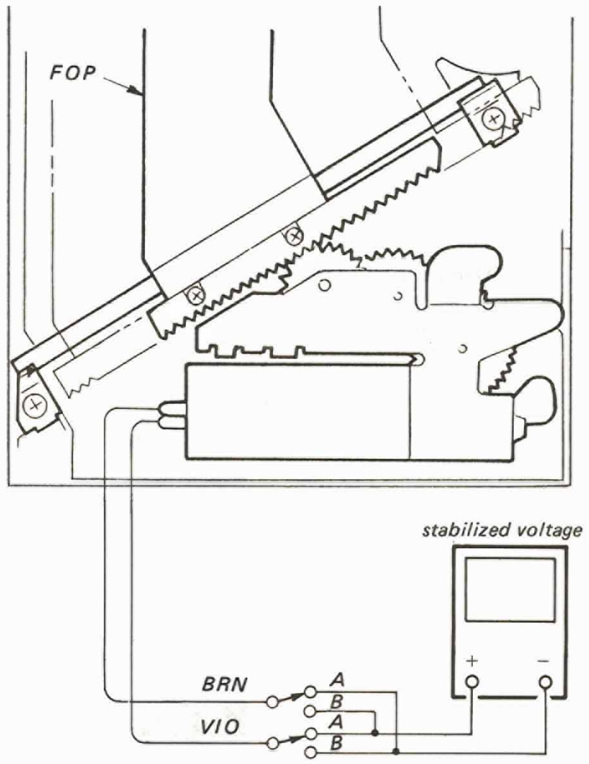
Sled Motor Response Check

If the following check is not satisfied, replace the sled motor (M902).

- **Minimum Activation Voltage Check.**
  1. Apply 1.5 V and check that the FOP moves smoothly from the inner to the outer circumference.
  2. Next apply 2 V and check that the FOP moves smoothly from the outer to the inner circumference.
- **Sled Sending Current Check**
  1. Apply 3 V and move the FOP from the innermost to the outermost circumference. Check that current value is less than 120 mA at this time.
  2. Next move the FOP from the outermost to the innermost circumference. Check that current value is less than 150 mA at this time.
- **Sled Sending Time Check**

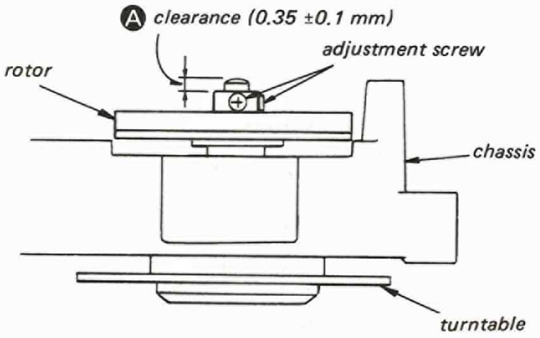
  Apply 3 V, and check that the time for the FOP to move from the innermost to the outermost circumference and from the outermost to the innermost circumference is less than 5 seconds each.

Switch position	Direction of movement	Switch position	Direction of movement
side A	inner to outer circumference	side B	outer to inner circumference


FOP
stabilized voltage
+
−
BRN
VIO
A
B
A
B

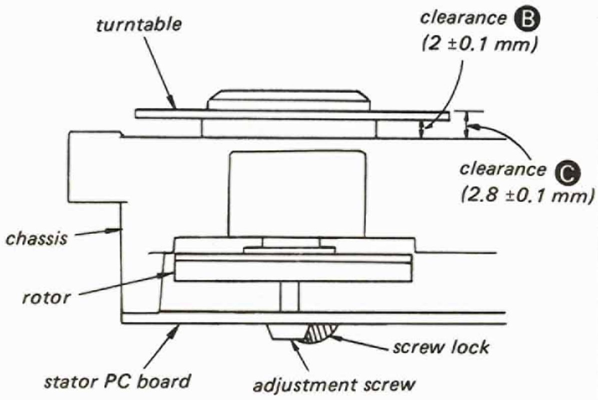
Rotor Mounting, Thrust Adjustment

Rotor Mounting


Ⓐ clearance (0.35 ±0.1 mm)
adjustment screw
rotor
chassis
turntable

Mount the rotor on the turntable shaft so that the clearance A above is 0.35 ±0.1 mm.

Thrust Adjustment


turntable
clearance Ⓑ (2 ±0.1 mm)
clearance Ⓒ (2.8 ±0.1 mm)
chassis
rotor
screw lock
stator PC board
adjustment screw

Adjust the adjustment screw so that clearance Ⓑ and Ⓒ above are as follows:

Ⓑ: 2 ±0.1 mm
Ⓒ: 2.8 ±0.1 mm

Lock the screw after adjustment.

SECTION 3
ADJUSTMENTS

3-1. ELECTRICAL ADJUSTMENTS

Notes on Adjustment

1. Perform adjustments in service mode.
   Be sure to release service mode after completing adjustment.
   (Refer to "Service Mode (service program)" on page 9-11.)
2. Perform adjustments in the order given.
3. Use YEDS-1, but only when disc use is indicated.
4. Power supply voltage: DC 9 V
   Power switch: ON

PREPARATION

Put the set into service mode (see page 9-11) and perform the following checks. Repair if there are any abnormalities.

- **Sled Motor Check**

1. Press the OPEN button and open the top panel.
2. Press the ▶▶|, |◀◀ keys and make sure that the FOP moves smoothly, without catching, from the inmost → outmost → inmost circumference.
   ▶▶|: FOP moves outward
   |◀◀: FOP moves inward

- **Focus Search Check**

1. Press the OPEN button and open the top panel.
2. Press the ▶▮▮ key. (Focus search is performed continuously. Laser does not emit.)
3. Observe the FOP objective lens and check that it moves smoothly up and down with no catching or noises.
4. Press the ■ key.
   Check that focus search operation stops. If it does not, press the ■ key again, longer.
   Note:
   For sets using MB88541-120M for microcomputer IC801, the objective lens may stay up and the disc table rotate at high speed when the ▶▮▮ key is pressed.
   (Sets using MB88541-120M for IC801 will only perform focus search once the second time after the focus on state has been obtained.)
   If this happens,
   1) Press ■ key.
   2) Unplug external power supply and press ▶▮▮ key.
   3) Plug in external power supply.
   4) Press ▶▮▮ key, without disc inserted. With this, focus search will be repeated over and over.

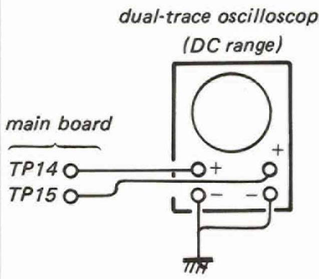
TRIANGULAR WAVE ADJUSTMENT

Conditions:

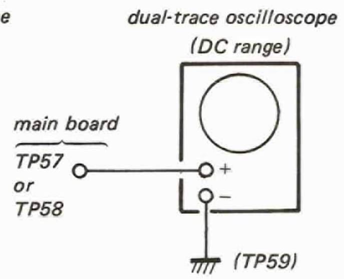
Set the ground levels of dual-trace oscilloscope CH1 and CH2 so that they are the same.

Adjustment Method:

checking triangular wave



Adjustment

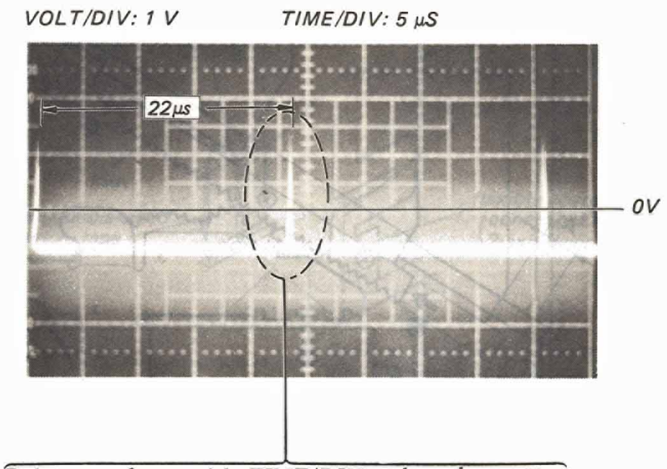


1. Connect the dual-trace oscilloscope to main board test points TP14 and TP15.
2. Put the set into service mode (refer to pages 9-11).
3. Observe the oscilloscope waveform and remember if offset voltage is off on the + or − side relative to 0 V. (Refer to triangular wave reference waveform).
4. Depending on the offset voltage, connect the dual-trace oscilloscope to main board test point TP57 or TP58.

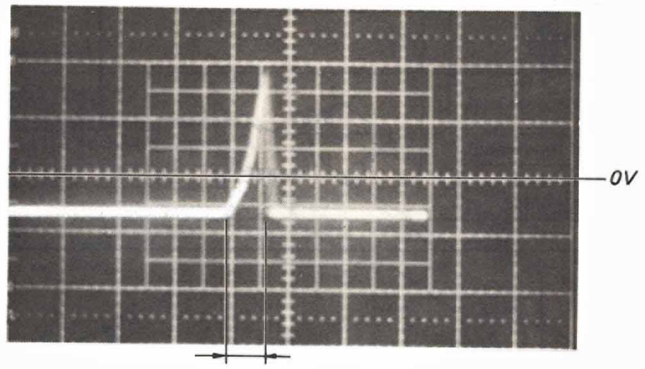
Offset voltage difference	Connection
−	TP 58 (IC507 ①)
+	TP 57 (IC507 ④)

5. Observe the oscilloscope waveform, and adjust RV503 so that pulse width is less than 200nS. when R548 is mounted, adjust pattern connection of R548 and RV503 together.
   After adjustment, check the waveform for the other test point (TP57 or TP58). If the pulse width is over 200nS, the test point connection was wrong in step 4. Repeat step 4.

- **Waveform for reference**



Pulse waveform with TIME/DIV enlarged to 200nS.

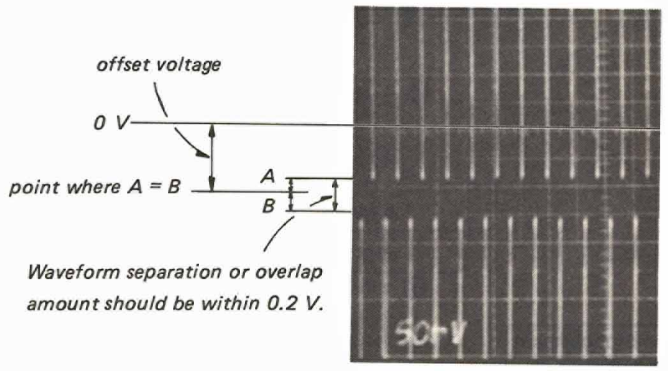


Adjust this width to less than 200nS.

6. Connect the dual-trace oscilloscope as in step 1 and confirm that the triangular wave separation or overlap amount is within 0.2 V.

- **Triangular wave reference waveform**
  (shows offset voltage off in one direction)
  VOLT/DIV: 50 mV TIME/DIV: 50 µS

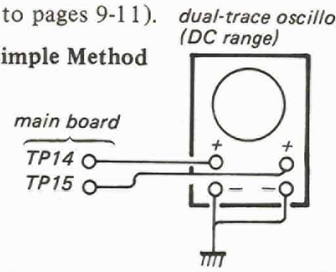
upper: TP14 (IC504 ⑤, ⑪)
lower: TP15 (IC504 ⑥, ⑧)



Waveform separation or overlap amount should be within 0.2 V.

7. After adjustment, release service mode. (Refer to pages 9-11).

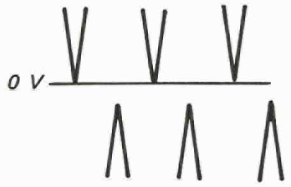
B) Simple Method



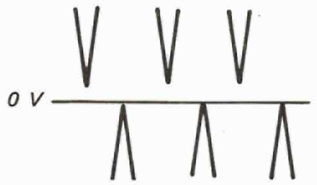
1. Connect the dual-trace oscilloscope to main board test points TP14 and TP15.
2. Put the set into service mode (refer to pages 9-11).
3. Observe the oscilloscope waveform and confirm if offset voltage is off on the + or − side relative to 0 V. (Refer to triangular wave reference waveform).
4. Depending on the offset voltage, adjust RV503 so that the tips of triangular wave are 0 V as fig. Ⓐ and Ⓑ below.
   When R548 is mounted, adjust pattern connection of R548 and RV503 together.

- **Waveform for adjustment**

Ⓐ When offset voltage is off in − direction.
(Adjust that the upper tips of waveform are 0 V.)

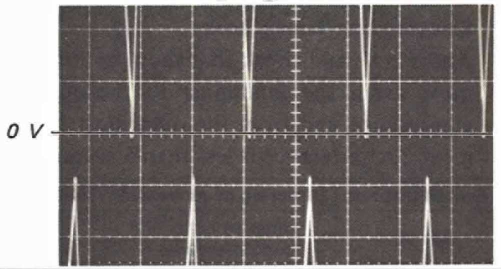


Ⓑ When offset voltage is off in + direction.
(Adjust that the lower tips of waveform are OV.)

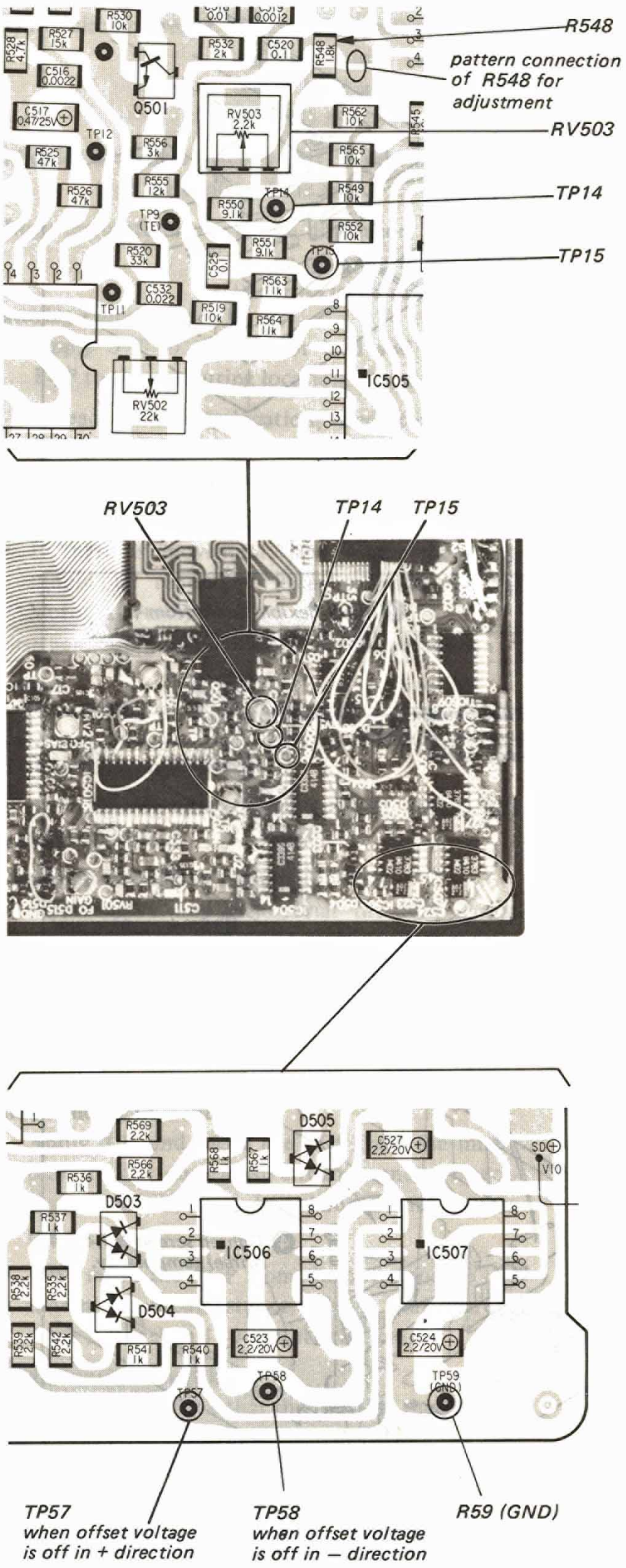


5. After adjustment, release service mode (See page 9-11.)

- **Waveform for reference**
  (Offset voltage is off in − direction)
  upper: TP14 (IC504 ⑤, ⑪) VOLT/DIV: 100 mV
  lower: TP15 (IC504 ⑥, ⑧) TIME/DIV: 10 µS

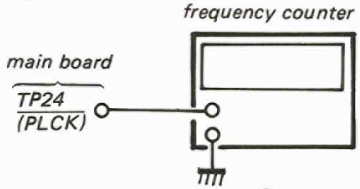


Check/Adjustment Location: Main board


R548
pattern connection of R548 for adjustment
RV503
TP14
TP15
Q501
TP12
TP9 (TE)
TP11
RV502 22k
IC505
RV503
TP14
TP15
D505
D503
D504
IC506
IC507
TP57 when offset voltage is off in + direction
TP58 when offset voltage is off in − direction
R59 (GND)

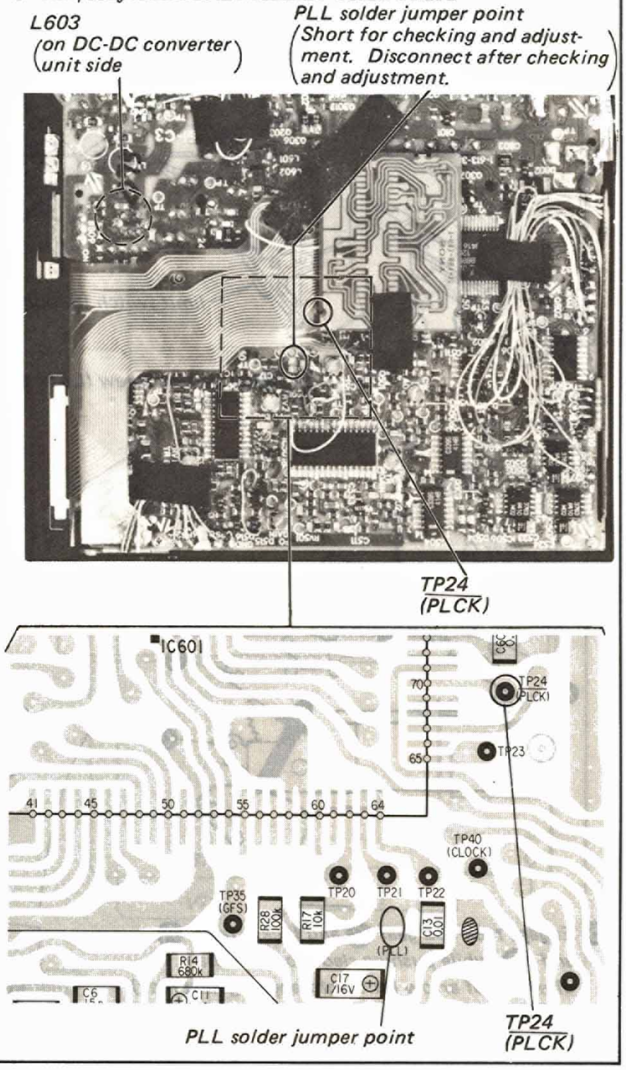
PLL FREE RUN FREQUENCY CHECK AND ADJUSTMENT

Check/Adjustment Procedure


frequency counter
main board
TP24
(PLCK)

1. Short the jumper point Ⓐ (PLL) in the diagram below.
2. Connect a frequency counter to main board test point TP24 ($\overline{\text{PLCK}}$).
3. Put the set into service mode (see page 9-11).
4. Check that the frequency counter reading is 4.3218 ±0.04 MHz. If not, adjust L603 so that it is 4.3218 ±0.01 MHz.
5. After adjustment, release service mode (see page 9-11).
6. Disconnect the jumper point shorted in step 1.

Check/Adjustment Location: Main board

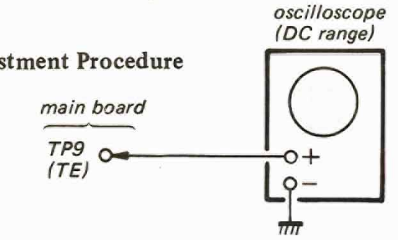

L603
(on DC-DC converter unit side)
PLL solder jumper point
(Short for checking and adjustment. Disconnect after checking and adjustment.)
TP24
(PLCK)
IC601
TP23
TP40 (CLOCK)
TP35 (GFS)
TP20
TP21
TP22
(PLL)
PLL solder jumper point
TP24
(PLCK)

TRACKING BALANCE ADJUSTMENT

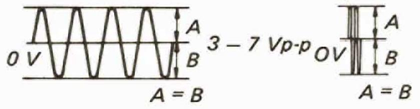
Conditions

The set should be placed either vertically or horizontally.

Adjustment Procedure

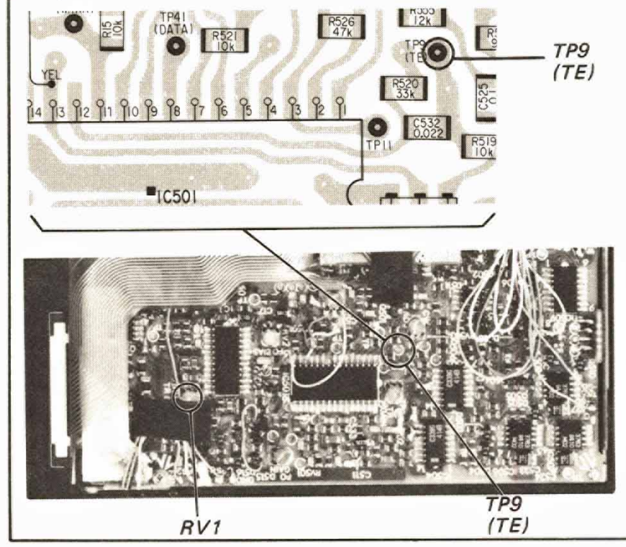

oscilloscope
(DC range)
main board
TP9
(TE)
+
−

1. Connect the oscilloscope to main board TP9 (TE).
2. Put the set into service mode (see page 9-11).
3. Press the ▶▶| and |◀◀ keys to move the FOP to the center.
4. Insert the disc (YEDS-1) and close the top panel.
5. Press the ▶▮▮ key.
   (It will go from focus search to focus ON, and CLV pull-in mode state. Tracking and sled are OFF.)
6. Adjust RV1 so that the oscilloscope waveform is symmetrical on the top and bottom in relation to 0 V.
   Note: Take sweep time as long as possible to obtain best waveform.


0 V
A
B
A = B
3 – 7 Vp-p
0V
A
B
A = B

7. Press the ■ key. Confirm that disc rotation stops. If it does not, press the ■ key again, longer.
8. After adjustment, release service mode (see page 9-11).

Adjustment Location: main board


TP41
(DATA)
R521
10k
R526
47k
TP9
(TE)
IC501
TP11
RV1
TP9
(TE)

SLED MOTOR OFFSET CHECK AND ADJUSTMENT

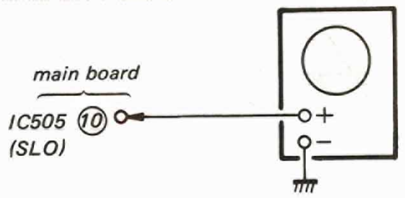
Conditions

Tracking balance adjustment should have been finished.

Close the top panel.

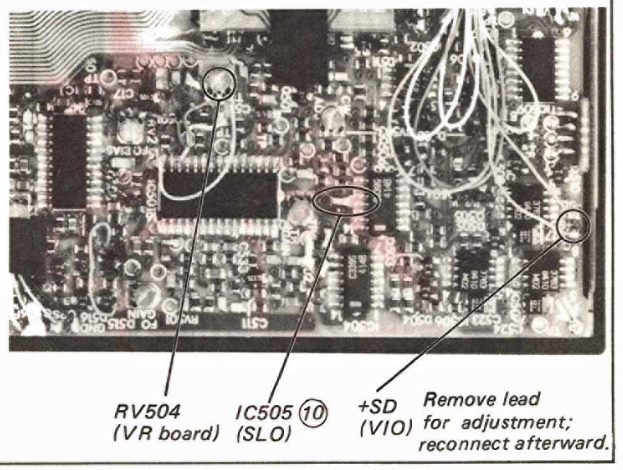
(If the top panel is left open, natural light will enter through the FOP objective lens, and adjustment will not be correct.)

Adjustment Procedure:


oscilloscope
(DC range)
main board
IC505 ⑩
(SLO)
+
−

1. Remove the sled motor +SD lead. (In this adjustment, DC voltage is applied to the tracking amp inside IC501, so this prevents the sled motor from running at abnormal-high speed if RV504 is adjusted too far to the + or – side.)
2. Connect the oscilloscope to main board IC505 pin ⑩ (SLO).
3. Put the set into service mode (see page 9-11).
4. Press the MODE button (tracking and sled go ON).
5. Press the ▶▮▮ key. (focus goes on).
   (This should be made after step 4.)
6. Adjust RV504 so that the oscilloscope reading is 0 ±0.05 V.
7. Press the ■ key.
   Confirm that focus search operation stops. If not, press the ■ key again, longer.
8. After adjustment, release service mode (see page 9-11).
9. Reconnect the sled motor lead removed in step 1.

Adjustment Location: main board, VR board

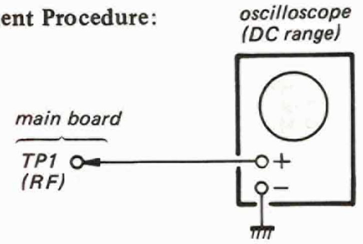

RV504
(VR board)
IC505 ⑩
(SLO)
+SD
(VIO)
Remove lead
for adjustment;
reconnect afterward.

FOCUS BIAS ADJUSTMENT

Conditions

The set should be placed either vertically or horizontally.

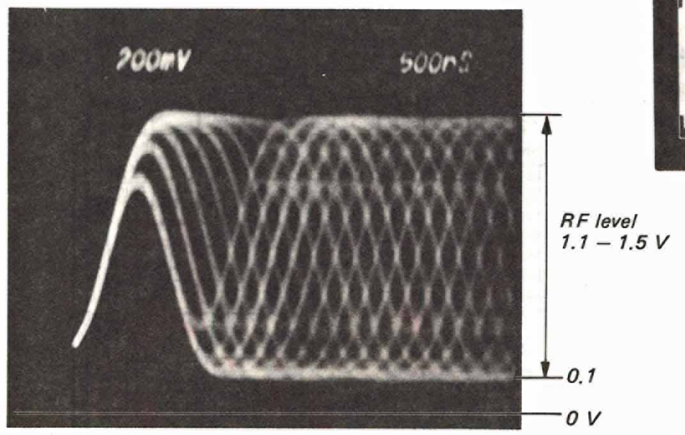
Adjustment Procedure:


oscilloscope
(DC range)
main board
TP1
(RF)
+
−

1. Put the set into service mode (see page 9-11).
2. Connect the oscilloscope to main board test point TP1 (RF).
3. Press the ▶▶| and |◀◀ keys to move the FOP to the center. (Move the FOP to the music area on the disc to enable easy visibility of the eye pattern).
4. Insert the disc (YEDS-1) and close the top panel.
5. Press the ▶▮▮ key.
   (It will go from focus search to focus ON, and CLV pull-in mode state. Tracking and sled are OFF).
6. Press the MODE button. (Tracking and sled go ON).
7. Adjust RV2 so that the oscilloscope waveform eye pattern is good. A good eye pattern means that the diamond shape (◊) in the center of the waveform can be clearly distinguished.

- **RF Signal Reference Waveform (eye pattern)**

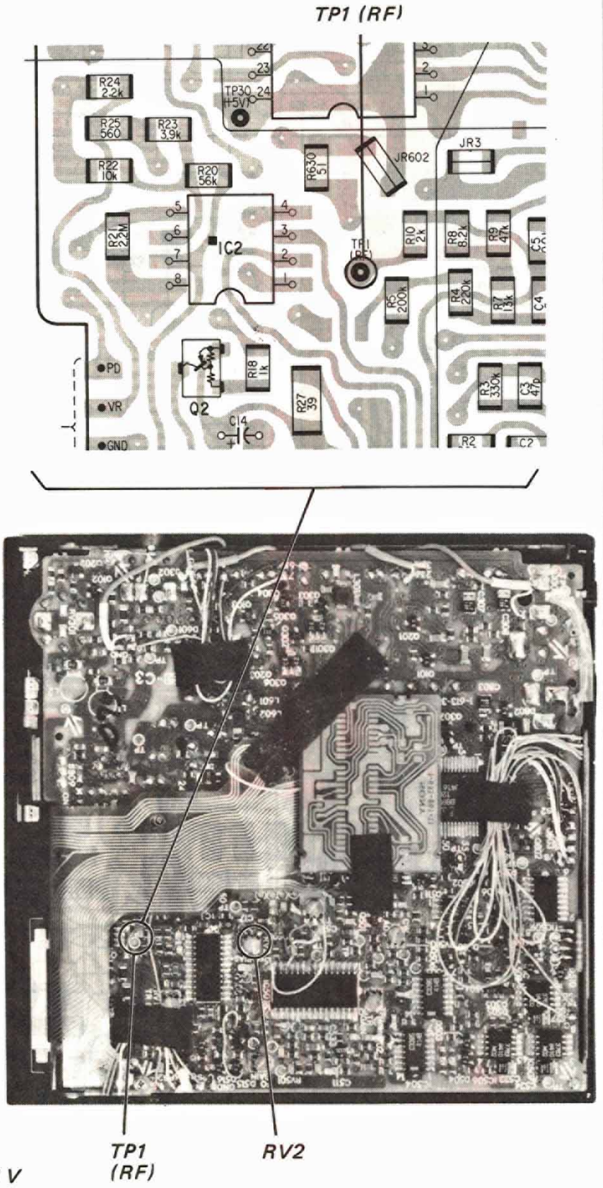
VOLT/DIV: 200 mV
TIME/DIV: 500 nS



When observing the eye pattern, set the oscilloscope for AC range and raise vertical sensitivity.

8. Press the ■ key. Confirm that disc rotation stops. If not, press the ■ key again, longer.
9. After adjustment, release service mode (see page 9-11).

Adjustment Location : main board


TP1 (RF)
R24
22k
R25
560
R23
3.9k
R22
10k
R20
56k
IC2
TP1
JR602
JR3
Q2
PD
VR
GND
TP1
(RF)
RV2

FOCUS/TRACKING GAIN ADJUSTMENT

Focus/tracking gain determines the pick-up follow-up (vertical and horizontal) relative to mechanical noise and mechanical shock when the 2-axis device operates.
However, as these reciprocate, the adjustment is at the point where both are satisfied.

- When gain is high, the noise when the 2-axis device operates increases.
- When gain is low, it is more susceptible to mechanical shock and skipping occurs more easily.

This adjustment is to be performed when replacing the following parts:
FOP, RV501 (focus gain VR), RV502 (tracking gain VR)

Adjustment Method:
– Focus Gain Adjustment –
This adjustment is not performed.
If the focus gain VR RV501 is turned, set to mechanical center (see Fig. 6).

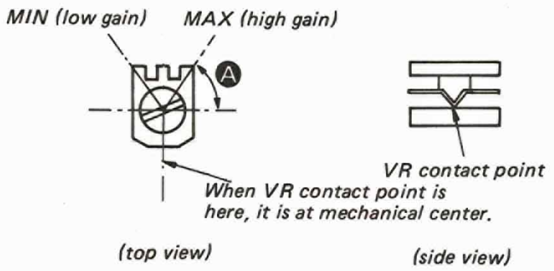
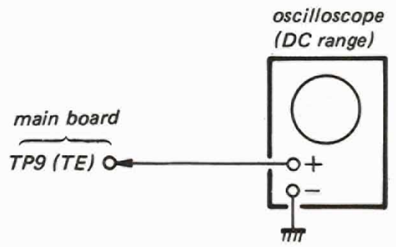

MIN (low gain)
MAX (high gain)
Ⓐ
VR contact point
When VR contact point is here, it is at mechanical center.
(top view)
(side view)

Fig. 6 Mechanical Center (seen from chip mounted side)

– Tracking Gain Adjustment –
(perform at normal operation)


oscilloscope
(DC range)
main board
TP9 (TE)
+
–

1. Place the set level, horizontally (upper panel can be facing down). (If the set is not level, the 2-axis device will be weighted and adjustment cannot be done.)
2. Connect the oscilloscope to main board test point TP9 (TE).
3. Turn the power switch on, insert the disc (YEDS-1) and press the ▶❚❚ key.
4. Turn RV502 slightly clockwise (tracking gain drops) and obtain a waveform with a fundamental wave (waveform has large waves) as in Figure 7.
5. Turn RV502 slowly counterclockwise (tracking gain rises) until the fundamental wave disappears (no large waves) as in Figure 8.
6. Set RV502 to the position about 30° counterclockwise from the position obtained in step 5. If RV502 contact point location is within the range shown in Figure 6 Ⓐ, tracking gain is too high. In this case, readjust from step 4.
7. Select AMS mode with the MODE button, continuously press ▶▶| or |◀◀ key and observe the 100 track jump waveform. Check that no traverse waveform appears for both ▶▶| and |◀◀ directions. (See Figures 9 and 10.) It is acceptable if the traverse waveform appears only now and then, but if it appears constantly, raise tracking gain slightly and check step 7 again.
8. Check that there is not an abnormal amount of operation noise (white noise) from the 2-axis device. If there is, tracking gain is too high, so readjust starting with step 4.

The waveforms are those measured with the oscilloscope set as shown below.
VOLT/DIV: 1 V
TIME/DIV: 5 mV

- Waveform when tracking gain is lowered. Fundamental wave appears (large waves).

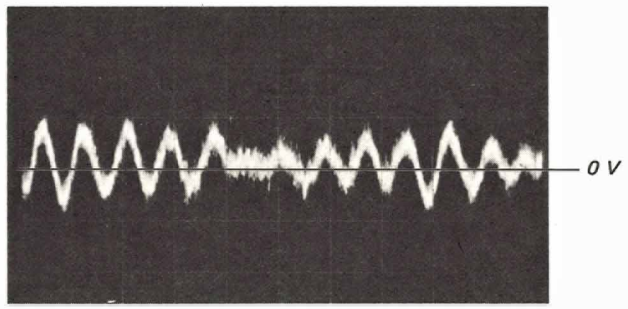


Fig. 7

- Waveform when fundamental wave disappears (no large waves).

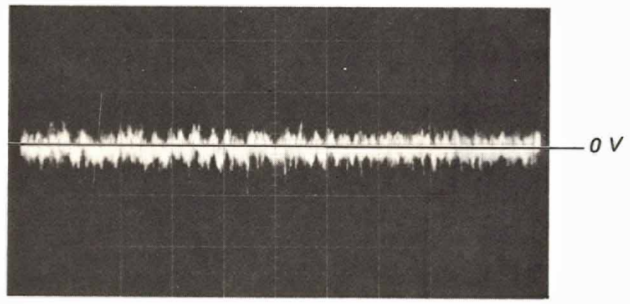


Fig. 8

- Waveform with no traverse waveform during 100 track jump. (Brake application is smooth because of adjustment).

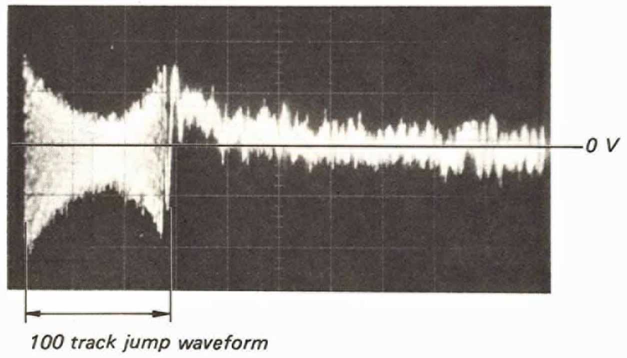


Fig. 9

- Waveform with traverse waveform during 100 track jump. (Brake application is poor because of low tracking gain.)

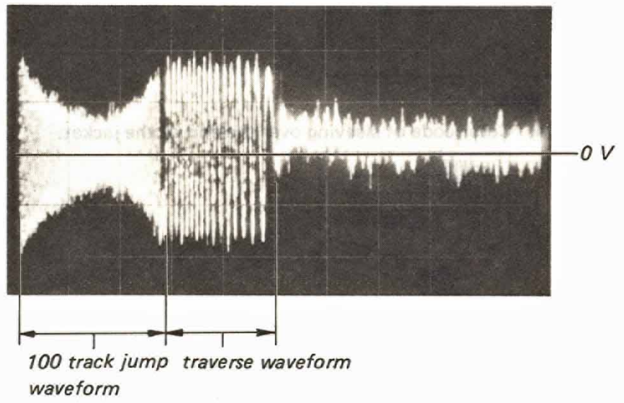
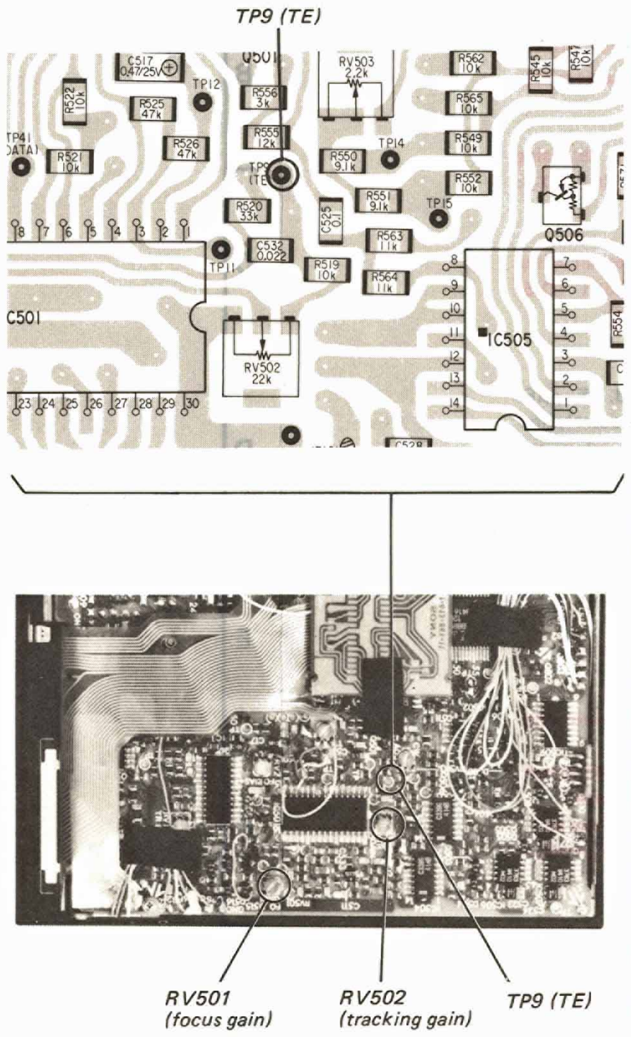


Fig. 10

Adjustment Location: main board


TP9 (TE)
C517 0.47/25V
Q501
RV503 2.2k
R562 10k
R545 10k
R547 10k
R522 10k
R525 47k
TP12
R556 3k
R565 10k
TP41 (DATA)
R521 10k
R526 47k
R555 12k
R550 9.1k
TP14
R549 10k
TP9 (TE)
R552 10k
R520 33k
R551 9.1k
C525 0.1
TP15
Q506
C532 0.022
TP11
R563 11k
R519 10k
R564 11k
IC501
IC505
R554
RV502 22k
C528
RV501 (focus gain)
RV502 (tracking gain)
TP9 (TE)

SECTION 4
DIAGRAMS

Note:

A part of the circuit in this model differs depending on the microcomputer (Old: MB88541-120M, New: MB88541-124M) being used for IC801. These differences are indicated by "Old" and "New" in schematic and mounting diagrams.

Old . . . . . shows the circuit or value of the set using type "MB88541-120M" for IC801 (**D-5: up to serial No. 104,000**).

New . . . . shows the wiring or value of the set using type "MB88541-124M" for IC801 (**D-5: serial No. 104,001 and later, D-50**).

Note:

- All capacitors are in μF unless otherwise noted. pF: μμF 50WV or less are not indicated except for electrolytics
- All resistors are in ohms, ¼W or less unless otherwise specified.
- ⇨ : signal path.
- Components for right channel have same values as for left channel. Reference numbers are coded from 200.
- △ : internal component.
- 1% shows tolerance.
- ━━ : B+ bus.
- ▬ ▬ ▬ : B– bus.
- ▭ : adjustment for repair.
- Voltages, waveform and total current are measured with top panel closed.
- Power voltage is DC 9 V and fed with regulated dc power supply from DC in 9 V (external power voltage) jack.
  Voltages are DC with respect to ground in service mode.
  Voltage variations may be noted due to normal production tolerances.
  no mark : stop mode
  ( ) : play mode
- Waveforms are taken to ground in service mode by using oscilloscope.
  Voltage variations may be noted due to normal production tolerances.
- Total current is measured in service mode.

- **Switch**

Ref. No.	Switch	Position
S801	POWER	OFF
S901	LASER ON	ON
S902	OPEN/CLOSE	ON
S903	LIMIT	OFF
S904	REMAIN	OFF
S905	MODE	OFF
S906	▶❚❚(PLAY/PAUSE)	OFF
S907	▶▶❘ (FF)	OFF
S908	❘◀◀ (FR)	OFF
S909	■ (STOP)	OFF

See page 9 – 12 for setup of service mode.

Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

4-1. MOUNTING DIAGRAM

- See page 52 for Semiconductor Lead Layouts.

6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
A
B
C
D
E
F
G
H
I
J
[LIQUID CRYSTAL MODULE]
Q, IC
D
[RIPPLE FILTER BOARD]
[MAIN BOARD]
(CHIP COMPONENT SIDE)
[SUB BOARD]
(CHIP COMPONENT SIDE)
[VR BOARD]
RV504 22k
KSS-110A
(OPTICAL PICK-UP BLOCK)
FOCUS COIL AND TRACKING COIL RESISTANCE VALUE: APPROX. 8Ω
FLEXIBLE BOARD HOLDER
SIGNAL INPUT
S902 OPEN/CLOSE (ON: THE DISC HOLDER IS SHUT.)
S901 LASER ON (ON: THE DISC HOLDER IS SHUT.)
DC-DC CONVERTER
FORMER
M901
BHR-3000A (DISC MOTOR)
CLOCK
CLV
GND
V BATTERY
TO OPTICAL PICK-UP BLOCK
22μSEC
2.8Vp-p
0V
[SYSTEM CONTROL SUB BOARD]
(CHIP COMPONENT SIDE)
IC, D
D851
IC852
IC851
IC853
SONY 1-613-861-

Note:

- Color code of sleeving over the end of the jacket.

WHT
RED
(RED)((GRY))

- ○── : parts extracted from the side where DC-DC converter unit is mounted.
- ●── : parts extracted from chip component side.

Through hole

- conductor pattern where DC-DC converter unit is mounted.
- ─➜─ : signal path
- ━━▪━➜ : L-CH signal path
- ━▪▪━➜ : R-CH signal path
- ▨ : B + pattern
- ▨ : B – pattern

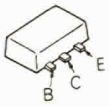
4-2. SCHEMATIC DIAGRAM

• See page 42 for Note.

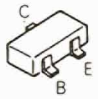
[MAIN BOARD]
IC1 CX20109 RF AMP/SIGNAL PROCESSOR
IC604 TL082CPS VCO
IC601 CX23035 DIGITAL SIGNAL PROCESSOR/CLV SERVO
Q601,602 2SD1048 VOLT. REG
[RIPPLE FILTER BOARD]
IC301 CX20133 D/A CONVERTER
IC101,201 TL072CPS INTEGRATOR
IC302 μPD4053BG SWITCH
IC101,201 TL072CPS SAMPLE HOLD
[SUB BOARD]
IC102 NJM4560M LOWPASS FILTER
KSS-110A OPTICAL PICK-UP BLOCK(1/2)
SIGNAL INPUT
LASER DIODE
IC602 MSM5129-20GS 16K BIT RAM
Q101,201 2SK300 DISCHARGE
IC303 μPD4053BG SWITCH
IC304 NJM4560M DE-EMPHASIS
Q102,202 2SD1048 MUTING
IC305 NJM4560S HEADPHONE AMP
Q103,203 2SD1048 HEADPHONE MUTING
LINE OUT
HEADPHONES
S901 LASER ON
Q1 2SB798
Q2 DTA124EK AUTOMATIC POWER CONTROL (LASER ON CIRCUIT)
IC2 NJM4558M
IC1 CX20109 TRACKING ERROR AMP
[VR BOARD]
IC501 CX20108 FOCUS/TRACKING/SLED SERVO
Q509 2SD1048 MUTING (FOCUS ERROR)
IC603 TL082CPS
IC604 TL082CPS
D601 1SS123
IC503 TL082CPS PWM CARRIER GENERATOR
D502 1S2835
Q501 2SD1048 BUFFER AMP
M901 DISC MOTOR
PWM MODULATOR
Q507 2SD1048 RIPPLE FILTER
[LIQUID CRYSTAL MODULE(1/2)]
ND901 LCD
BATT
AMS
SEARCH
IC202 NJM4560M LOWPASS FILTER
Q302,303 2SD1048 VOLT. REG
Q301 2SB798 VOLT. REG
Q304,305 2SB624
Q306 2SD999
Q307 DTA124EK
Q308 DTC124EK
Q309 DTA124EK INVERTER
IC802 S81250-HG VOLT. REG
IC504 NJM2901MB PWM COMPARATOR
IC506 MB3763PF PWM DRIVER (FOCUS)
OPTICAL PICK-UP BLOCK(1/2)
IC502 NJM4558M BIAS LEVEL SETTING
IC509 TC4049BF
Q502-505 2SD1048
IC505 NJM2901MB BATTERY LEVEL CHECK
IC801 MB88541-120M SYSTEM CONTROL
D501 RD5.1M
IC507 MB3763PF PWM DRIVER (TRACKING)
IC503 TL082CPS
IC505 NJM2901MB PWM COMPARATOR
IC508 MB3763PF PWM DRIVER(SLED)
Q506 DTA124EK SLED SWITCH
IC509 TC4069BF INVERTER
M902 SLED
D510 2SD1048 MUTING (TRACKING ERROR)
D504 1S2835
D503 1S2835
D505 1S2835
D511 1SS123
[SYSTEM CONTROL SUB BOARD]
IC851 TC4030BF
IC852 TC4027BF SUBQ CHECK CIRCUIT
IC853 TC4015BF
D851 1S2837
[LIQUID CRYSTAL MODULE(1/2)]
FORMER
NEW

- **Semiconductor Lead Layouts**

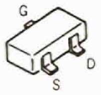
2SB798
2SD999



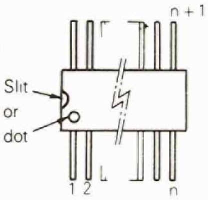
2SB624-BV5
2SD1048X6
DTA124EK
DTC124EK



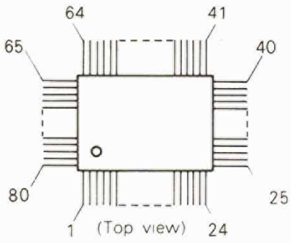
2SK300



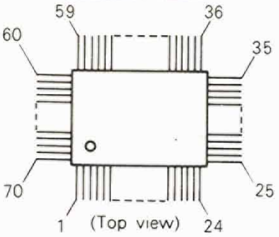
CX20108
CX20109
CX20133
HM6116EP-3
MB3763PF
NJM2901MB
NJM4558M
NJM4560M
TC4015BF
TC4027BF
TC4030BF
TC4049BF
TL072CPS
TL082CPS
μPD4053BG


n + 1
Slit
or
dot
1 2
n

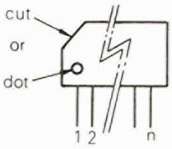
CX23035


64
41
65
40
80
25
1
(Top view)
24

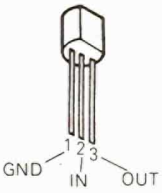
MB88541-124M


59
36
60
35
70
25
1
(Top view)
24

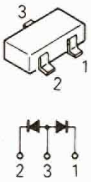
NJM4560S


cut
or
dot
1 2
n

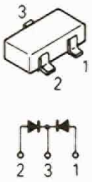
S81250HG


GND
1 2 3
IN
OUT

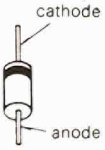
1S2835



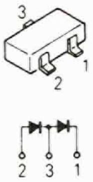
1S2837



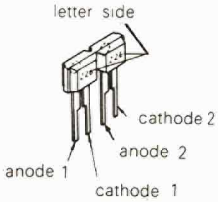
1SS106
HZ2ALL


cathode
anode

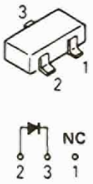
1SS123



KV1236E


letter side
cathode 2
anode 2
anode 1
cathode 1

RD5.1M-B2



SECTION 5
EXPLODED VIEWS AND PARTS LIST

NOTE:

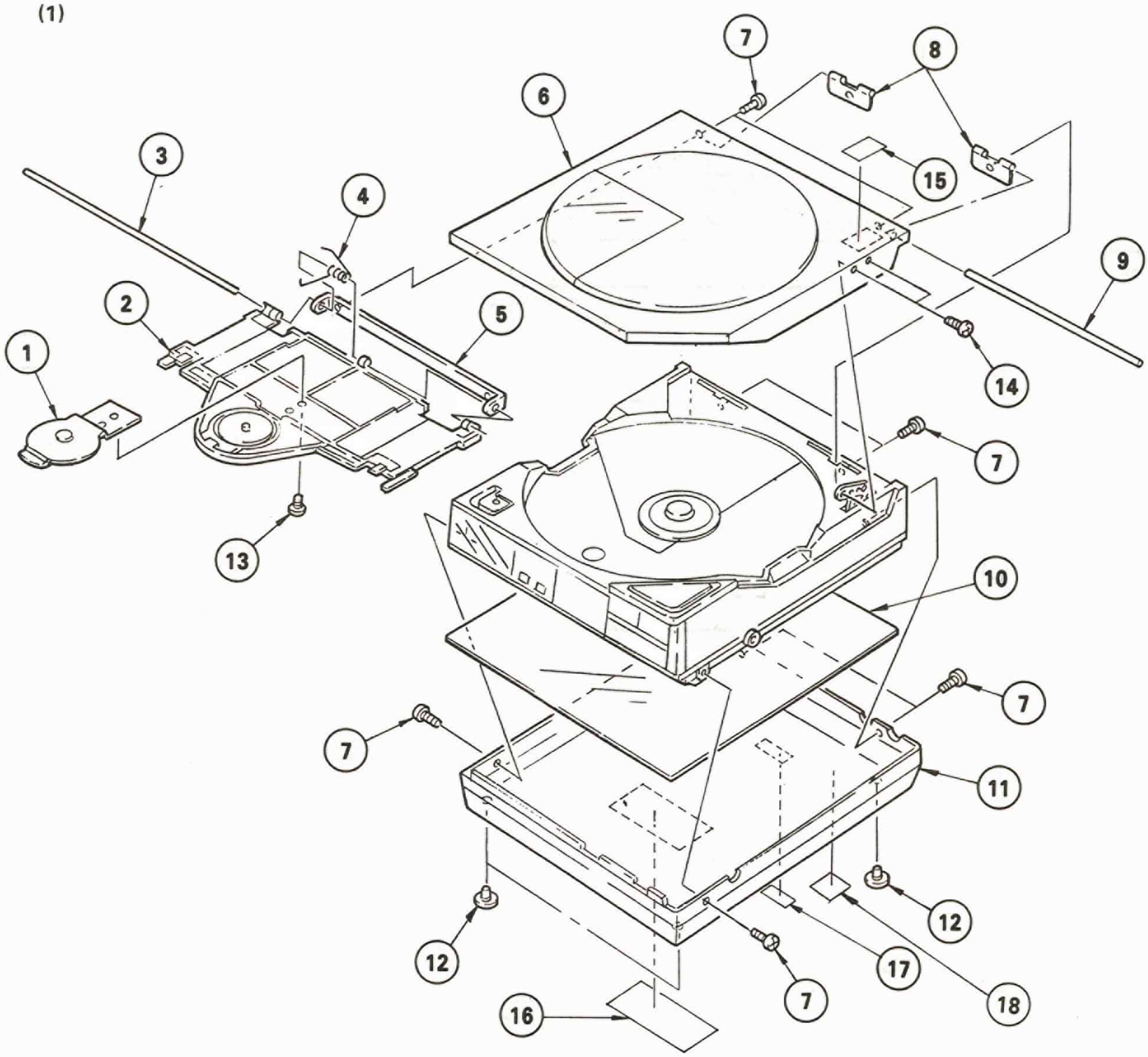
The mechanical parts with no reference number in the exploded views are not supplied.

- Items marked " ★ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.

- The construction parts of an assembled part are indicated with a collation number in the remark column.

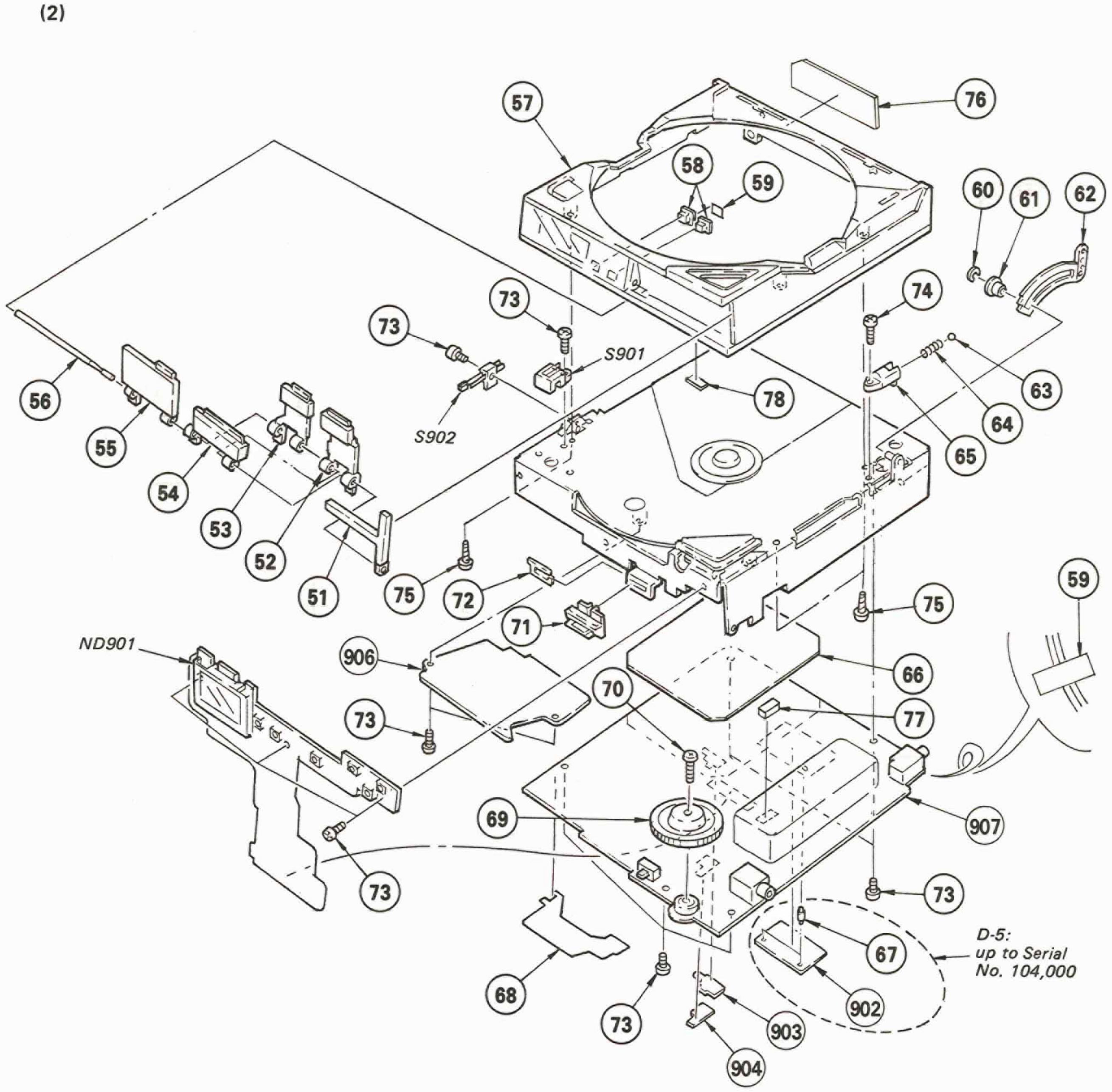
The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

(1)



No.	Part No.	Description	REMARKS
1	X-4907-008-1	PLATE ASSY, THRUST RETAINER	
2	X-4907-007-1	CHUCK ARM ASSY	
3	4-907-016-01	SHAFT, CHUCK ARM	
4	4-907-029-01	SPRING	
5	4-907-015-01	BRACKET, CHUCK ARM	
6	X-4907-009-2	PANEL ASSY, UPPER	
7	3-703-816-02	SCREW (M1.4X2)	
8	4-907-030-11	PLATE, FULCRUM	
9	4-907-031-01	BAR, FULCRUM	
10	4-907-071-01	SHEET, INSULATING	
11	X-4907-002-2	PANEL ASSY, BOTTOM	
12	4-907-091-01	FOOT, RUBBER	
13	7-627-850-08	SCREW, PRECISION +P 1.4X2	
14	7-627-551-38	SCREW, PRECISION +P 1.4X5	
15	3-703-709-00	STICKER, SONY SYMBOL	
16	4-885-838-00	(AEP,UK)...LABEL, CLASS 1	
17	3-527-213-00	(D-50)...LABEL, SERIAL NUMBER	
	3-701-999-00	(D-5)....LABEL, SERIAL NUMBER	
18	4-908-735-01	(AEP)...LABEL, SP	

(2)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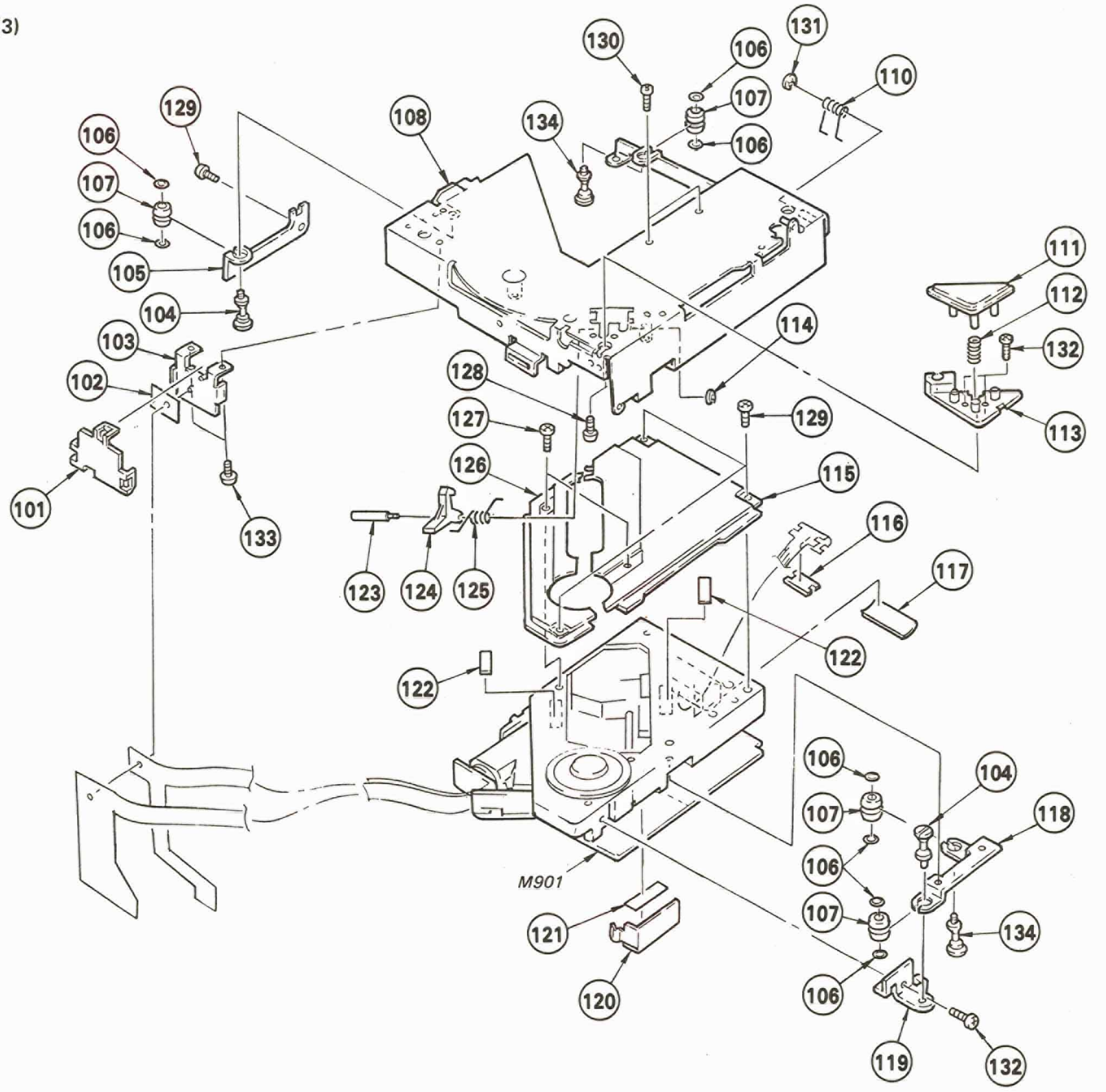
D-5:
up to Serial
No. 104,000

No.	Part No.	Description	REMARKS
51	4-907-062-01	ORNAMENT, BUTTON	
52	4-907-058-01	BUTTON, FF	
53	4-907-059-01	BUTTON, FR	
54	4-907-060-01	BUTTON, STOP	
55	4-907-057-01	BUTTON, PLAY PAUSE	
56	4-907-034-01	SHAFT, BUTTON	
57	X-4907-001-2	CABINET ASSY	
58	4-907-033-01	BUTTON, REMAIN MODE	
59	3-831-441-XX	CUSHION	
60	3-318-236-01	WASHER, POLY, SLIT	
61	4-907-047-01	COLLAR, SWITCHING ARM	
62	4-907-073-01	ARM (OUTSERT), SWITCHING	
63	7-671-112-11	BALL, STEEL	
64	4-907-024-01	SPRING, COMPRESSION	
65	4-907-018-01	HOLDER, SPRING	
66	4-907-049-01	SHEET, BLIND	
67	4-907-082-01	(D-5:UP TO SERIAL No.104000)... SPACER, PC BOARD	
68	4-907-077-01	HOIL, SHEILD	
69	4-907-056-11	KNOB, CONTROL	
70	3-888-156-00	SCREW (1.7X4)	
71	4-907-032-11	KNOB, SAFETY	
72	4-907-048-01	RETAINER, SAFETY KNOB	
73	7-627-850-27	SCREW, PRECISION +P 1.4X3	
74	7-627-850-68	SCREW, PRECISION +P 1.4X4	
75	7-685-103-14	SCREW +P 2X5 TYPE2 NON-SLIT	
76	4-907-092-02	(D-5)....LABEL, MODEL NUMBER	
	4-907-093-02	(D-50)...LABEL, MODEL NUMBER	
77	9-911-840-XX	CUSHION	
78	3-831-441-11	SPACER	
902	*1-613-861-11	(D-5:UP TO SERIAL No.104000)... PC BOARD, SYSCON SUB	
903	*1-613-862-11	PC BOARD, VR	
904	*1-614-214-11	PC BOARD, RIPPLE FILTER	
906	*A-3015-294-A	PC BOARD ASSY, SUB	
907	*A-3070-134-A	MOUNTED PCB, MAIN	

(3)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No.	Part No.	Description	REMARKS
101	4-907-036-01	RETAINER, FLEXIBLE	
102	7-632-205-00	SHEET, ADHESIVE, FLEXIBLE	
103	*4-907-035-01	HOLDER, FLEXIBLE	
104	4-907-041-01	SCREW, INSULATOR	
105	4-907-039-01	HOLDER (A), INSULATOR	
106	4-907-053-01	RING, O	
107	4-907-054-01	INSULATOR	
108	X-4907-003-2	CHASSIS ASSY, MAIN	
109	3-701-439-21	WASHER	
110	4-907-080-01	SPRING	
111	4-907-055-11	BUTTON, OPEN	
112	4-907-020-01	SPRING, COMPRESSION	
113	4-907-023-11	GUIDE, OPEN BUTTON	
114	3-318-236-01	WASHER, PLASTIC	
115	4-907-064-01	COVER (A), MD	
116	4-907-084-01	REINFORCEMENT, FLEXIBLE	
117	3-831-441-XX	CUSHION	
118	4-907-040-01	HOLDER (B), INSULATOR	
119	4-907-050-01	HOLDER (C), INSULATOR	
120	4-907-076-01	PLATE, SHIELD, CLV	
121	3-563-105-00	SHEET, INSULATING, MOTOR PCB	
122	9-911-837-XX	SPACER	
123	4-907-027-01	SHAFT, LOCK CLAW	
124	4-907-025-11	CLAW, LOCK	
125	4-907-026-01	SPRING	
126	4-907-065-01	COVER (B), MD	
127	3-703-816-01	SCREW (M1.4)	
128	3-318-203-61	SCREW (B1.7X4), TAPPING	
129	7-627-553-38	SCREW, PRECISION +P 2X3	
130	7-627-551-58	SCREW, PRECISION +P 1.4X3	
131	7-624-105-04	STOP RING 2.3, TYPE -E	
132	7-627-850-68	SCREW, PRECISION +P 1.4X4	
133	7-627-850-27	SCREW, PRECISION +P 1.4X3	
134	4-908-710-01	SCREW (B), INSULATOR	

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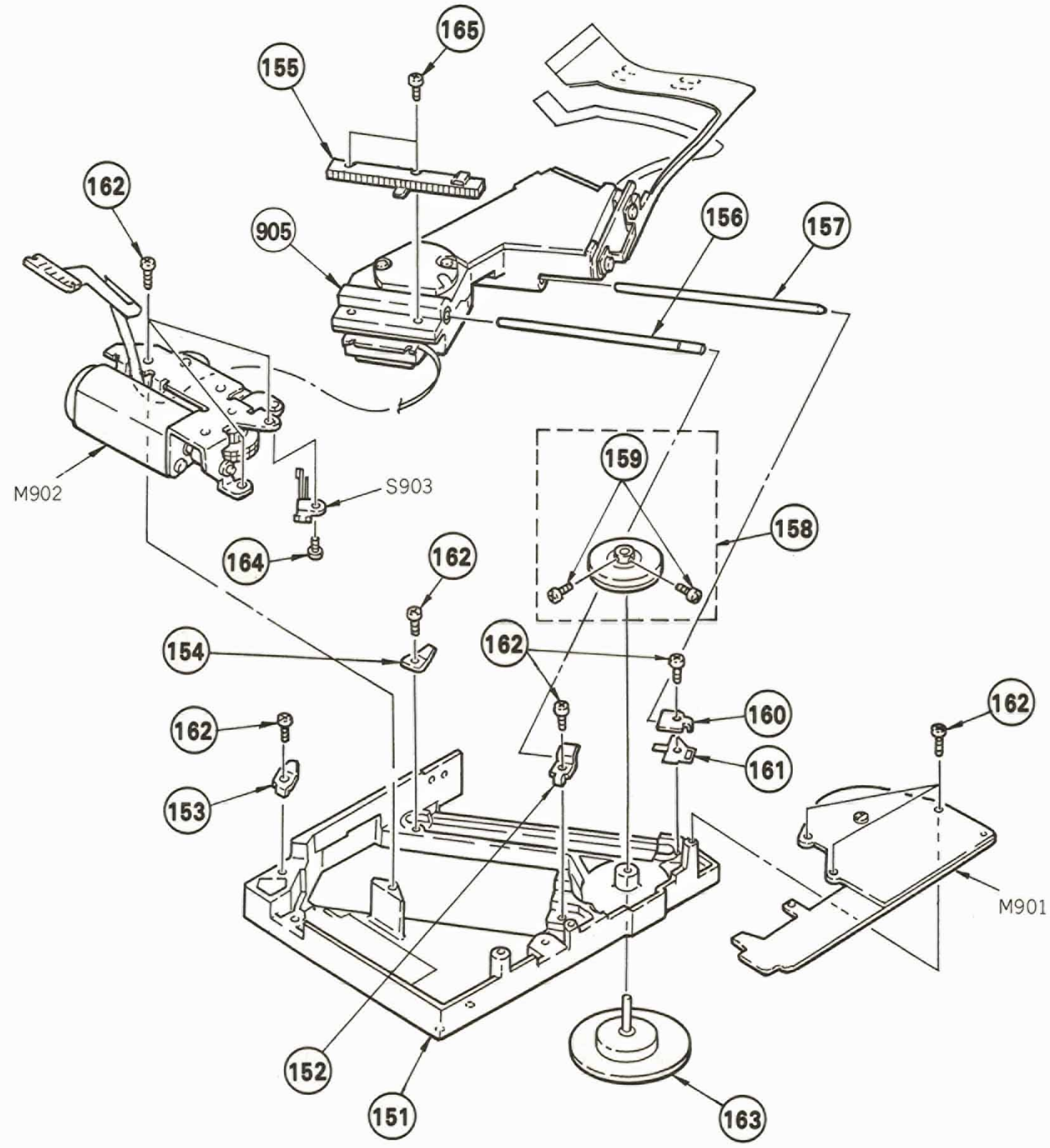
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No.	Part No.	Description	REMARKS
151	*X-3320-103-1	CHASSIS ASSY	
152	3-320-102-01	RETAINER (A)	
153	3-320-103-01	RETAINER (B)	
154	3-320-104-01	RETAINER (C)	
155	3-320-121-01	RACK	
156	3-320-106-01	SHAFT (A)	
157	3-320-107-01	SHAFT (B)	
158	X-2622-803-1	ROTOR ASSY	159
159	2-622-805-01	SCREW	
160	3-320-105-01	RETAINER (D)	
161	3-320-131-01	SPRING (B), LEAF	
162	3-703-816-11	SCREW (M1.4X4)	
163	X-3320-101-1	TURNTABLE ASSY	
164	7-627-553-37	SCREW, PRECISION +P 2X3	
165	7-627-552-77	SCREW, PRECISION +P 1.7×6.0	
905 ⚠	•	DEVICE, OPTICAL, KSS-110A (RP)	

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

NOTE:

- Items marked " ✱ " are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- If there are two or more same circuitsin a set such as a stereophonic machine, only typical circuit parts may be indicated and capacitors and resistors in other same circuits may be omitted.

CAPACITORS:
MF:μF, PF:μμF.

RESISTORS
- All resistors are in ohms.
- F : nonflammable

COILS
- MMH : mH, UH : μH

SEMICONDUCTORS
In each case, U : μ, for example:
UA...: μA..., UPA...: μPA..., UPC...: μPC,
UPD...: μPD...

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
901	*1-535-511-11	FRAME, LEAD (F TYPE)			
902	*1-613-861-11	(D-5:UP TO SERIAL No.104000)..... PC BOARD, SYSCON SUB			
903	*1-613-862-11	PC BOARD, VR			
904	*1-614-214-11	PC BOARD, RIPPLE FILTER			
905 ⚠	•	DEVICE, OPTICAL, KSS-110A (RP)			
906	*A-3015-294-A	PC BOARD ASSY, SUB			
907	*A-3070-134-A	MOUNTED PCB, MAIN			
C1	1-123-646-00	ELECT	33MF	20%	6.3V
C2	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C3	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C4	1-163-088-00	CERAMIC CHIP	5PF	0.25PF	50V
C5	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V
C6	1-163-097-00	CERAMIC CHIP	15PF	5%	50V
C7	1-123-646-00	ELECT	33MF	20%	6.3V
C8	1-163-114-00	CERAMIC CHIP	75PF	5%	50V
C9	1-163-114-00	CERAMIC CHIP	75PF	5%	50V
C10	1-163-074-00	CERAMIC CHIP	0.033MF	10%	25V
C11	1-135-091-00	CERAMIC CHIP	1MF	10%	16V
C12	1-123-646-00	ELECT	33MF	20%	6.3V
C13	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V
C14	1-123-661-00	ELECT	100MF	20%	6.3V
C15	1-163-038-00	CERAMIC CHIP	0.1MF		25V
C16	1-163-038-00	CERAMIC CHIP	0.1MF		25V
C17	1-135-091-00	TANTAL. CHIP	1MF	10%	16V
C101	1-163-212-00	CERAMIC CHIP	0.002MF	5%	50V
C102	1-123-646-00	ELECT	33MF	20%	6.3V
C103	1-163-188-00	CERAMIC CHIP	200PF	5%	50V
C104	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C105	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C106	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C107	1-163-108-00	CERAMIC CHIP	43PF	5%	50V
C108	1-163-211-00	CERAMIC CHIP	0.0018MF	5%	50V
C110	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C111	1-163-108-00	CERAMIC CHIP	43PF	5%	50V
C112	1-163-056-00	CERAMIC CHIP	0.0056MF	10%	50V
C113	1-130-477-00	MYLAR	0.0033MF	5%	50V
C114	1-131-375-00	TANTALUM	4.7MF	20%	10V
C115	1-131-375-00	TANTALUM	4.7MF	20%	10V
C116	1-163-055-00	CERAMIC CHIP	0.0047MF	10%	50V
C201	1-163-212-00	CERAMIC CHIP	0.002MF	5%	50V
C202	1-123-646-00	ELECT	33MF	20%	6.3V
C203	1-163-188-00	CERAMIC CHIP	200PF	5%	50V
C204	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C205	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C206	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C207	1-163-108-00	CERAMIC CHIP	43PF	5%	50V

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
C208	1-163-211-00	CERAMIC CHIP	0.0018MF	5%	50V
C210	1-163-335-11	CERAMIC CHIP	0.001MF	5%	50V
C211	1-163-108-00	CERAMIC CHIP	43PF	5%	50V
C212	1-163-056-00	CERAMIC CHIP	0.0056MF	10%	50V
C213	1-130-477-00	MYLAR	0.0033MF	5%	50V
C214	1-131-375-00	TANTALUM	4.7MF	20%	10V
C215	1-131-375-00	TANTALUM	4.7MF	20%	10V
C216	1-163-055-00	CERAMIC CHIP	0.0047MF	10%	50V
C301	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C302	1-163-099-00	CERAMIC CHIP	18PF	5%	50V
C303	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C304	1-163-141-00	CERAMIC CHIP	0.001MF	10%	50V
C305	1-123-647-00	ELECT	47MF	20%	6.3V
C306	1-123-820-00	ELECT	33MF	20%	16V
C307	1-135-096-21	TANTAL. CHIP	4.7MF	20%	10V
C308	1-135-096-21	TANTAL. CHIP	4.7MF	20%	10V
C310	1-123-647-00	ELECT	47MF	20%	6.3V
C312	1-123-647-00	ELECT	47MF	20%	6.3V
C313	1-123-646-00	ELECT	33MF	20%	6.3V
C314	1-123-646-00	ELECT	33MF	20%	6.3V
C315	1-123-298-00	ELECT	470MF	20%	6.3V
C316	1-123-298-00	ELECT	470MF	20%	6.3V
C317	1-123-333-00	ELECT	100MF	20%	16V
C318	1-123-322-00	ELECT	330MF	20%	16V
C319	1-123-661-00	ELECT	100MF	20%	6.3V
C320	1-123-661-00	ELECT	100MF	20%	6.3V
C321	1-135-092-21	TANTAL. CHIP	3.3MF	20%	16V
C322	1-102-973-00	CERAMIC	100PF	5%	50V
C501	1-123-646-00	ELECT	33MF	20%	6.3V
C502	1-131-379-00	TANTALUM	22MF	20%	10V
C503	1-163-038-00	CERAMIC CHIP	0.1MF		25V
C504	1-163-081-00	CERAMIC CHIP	0.22MF		25V
C505	1-163-033-00	CERAMIC CHIP	0.022MF	10%	25V
C506	1-163-035-00	CERAMIC CHIP	0.047MF	10%	25V
C507	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V
C508	1-163-114-00	CERAMIC CHIP	75PF	5%	50V
C509	1-163-109-00	CERAMIC CHIP	47PF	5%	50V
C510	1-163-081-00	CERAMIC CHIP	0.22MF		25V
C511	1-135-103-00	TANTAL. CHIP	3.3MF	10%	4V
C512	1-163-124-00	CERAMIC CHIP	200PF	5%	50V
C513	1-163-019-00	CERAMIC CHIP	0.0068MF	10%	50V
C514	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V
C515	1-163-019-00	CERAMIC CHIP	0.0068MF	10%	50V
C516	1-163-013-00	CERAMIC CHIP	0.0022MF	10%	50V
C517	1-135-083-00	TANTAL. CHIP	0.47MF	10%	25V
C518	1-163-021-00	CERAMIC CHIP	0.01MF	10%	50V

ELECTRICAL PARTS

Ref.No.	Part No.	Description
C519	1-163-143-00	CERAMIC CHIP 0.0012MF 10% 50V
C520	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C521	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C522	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C523	1-135-088-21	TANTAL. CHIP 2.2MF 20% 20V
C524	1-135-088-21	TANTAL. CHIP 2.2MF 20% 20V
C525	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C526	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C527	1-135-088-21	TANTAL. CHIP 2.2MF 20% 20V
C528	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C529	1-163-033-00	CERAMIC CHIP 0.022MF 10% 25V
C530	1-163-033-00	CERAMIC CHIP 0.022MF 10% 25V
C531	1-135-091-00	TANTAL. CHIP 1MF 10% 16V
C532	1-163-033-00	CERAMIC CHIP 0.022MF 10% 25V
C533	1-163-059-00	CERAMIC CHIP 0.01MF 10% 50V
C534	1-163-021-00	CERAMIC CHIP 0.01MF 10% 50V
C535	1-163-033-00	CERAMIC CHIP 0.022MF 10% 50V
C536	1-135-091-00	TANTAL. CHIP 1MF 10% 16V
C537	1-163-036-00	(D-5:UP TO SERIAL No.104000).... CERAMIC CHIP 0.068MF 50V
C538	1-135-083-00	TANTAL. CHIP 0.47MF 10% 25V
C601	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C602	1-163-101-00	CERAMIC CHIP 22PF 5% 50V
C603	1-163-101-00	CERAMIC CHIP 22PF 5% 50V
C604	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C605	1-135-091-00	TANTAL. CHIP 1MF 10% 16V
C606	1-163-033-00	CERAMIC CHIP 0.022MF 10% 25V
C607	1-123-617-00	ELECT 10MF 20% 16V
C608	1-163-117-00	CERAMIC CHIP 100PF 5% 50V
C609	1-163-594-00	CERAMIC CHIP 33PF 5% 50V
C610	1-163-105-00	CERAMIC CHIP 33PF 5% 50V
C611	1-163-123-00	CERAMIC CHIP 180PF 5% 50V
C612	1-163-833-00	CERAMIC CHIP 0.068MF 25V
C613	1-123-618-00	ELECT 22MF 20% 6.3V
C614	1-163-022-00	CERAMIC CHIP 0.012MF 10% 50V
C615	1-163-021-00	CERAMIC CHIP 0.01MF 10% 50V
C616	1-163-038-00	CERAMIC CHIP 0.1MF 25V
C617	1-123-646-00	ELECT 33MF 20% 6.3V
C618	1-123-646-00	ELECT 33MF 20% 6.3V
C801	1-163-119-00	CERAMIC CHIP 120PF 5% 50V
C802	1-135-101-21	TANTAL. CHIP 22MF 20% 6.3V
C803	1-135-088-21	TANTAL. CHIP 2.2MF 20% 20V
C851	1-163-038-00	(D-5:UP TO SERIAL No.104000)..... CERAMIC CHIP 0.1MF 25V
C901	1-163-055-00	(D-5:UP TO SERIAL No.104000)..... CERAMIC CHIP 0.0047MF 10% 50V
C901	1-163-017-00	(D-5:SERIAL No.104001 AND LATER,D-50) ...CERAMIC CHIP 0.0047MF 10% 50V

ELECTRICAL PARTS

Ref.No.	Part No.	Description
CN301⚠.	1-507-749-00	JACK, EXTENTION POWER
CP301⚠.	1-464-378-11	CONVERTER UNIT, DC-DC
D1	8-719-921-11	DIODE HZ2ALL
D501	8-719-105-82	DIODE RD5.1M-B2
D502	8-719-100-03	DIODE 1S2835
D503	8-719-100-03	DIODE 1S2835
D504	8-719-100-03	DIODE 1S2835
D505	8-719-100-03	DIODE 1S2835
D506	8-719-100-03	DIODE 1S2835
D507	8-719-100-03	DIODE 1S2835
D508	8-719-100-03	DIODE 1S2835
D509	8-719-100-03	DIODE 1S2835
D510	8-719-100-03	DIODE 1S2835
D511	8-719-101-23	DIODE 1SS123
D512	8-719-101-23	DIODE 1SS123
D513	8-719-911-06	DIODE 1SS106
D514	8-719-100-03	(D-5:UP TO SERIAL No.104000) .....DIODE 1S2835
D515	8-719-101-23	DIODE 1SS123
D516	8-719-101-23	DIODE 1SS123
D601	8-719-101-23	DIODE 1SS123
D602	8-719-923-65	DIODE KV1236-E
D801	8-719-100-03	DIODE 1S2835
D802	8-719-100-03	DIODE 1S2835
D803⚠.	8-719-101-58	(UK)....DIODE RD5.6E-L2
D851	8-719-100-05	(D-5:UP TO SERIAL No.104000) .....DIODE 1S2837
FL101	1-235-403-11	FILTER, LOW PASS
FL201	1-235-403-11	FILTER, LOW PASS
IC1	8-752-010-90	IC CX20109
IC2	8-759-700-43	IC NJM4558M
IC101	8-759-908-16	IC TL072CPS
IC102	8-759-745-64	IC NJM4560M
IC201	8-759-908-16	IC TL072CPS
IC202	8-759-745-64	IC NJM4560M
IC301	8-752-013-30	IC CX20133
IC302	8-759-103-25	IC UPD4053BG
IC303	8-759-103-25	IC UPD4053BG
IC304	8-759-745-64	IC NJM4560M
IC305	8-759-700-40	IC NJM4560S
IC501	8-752-010-80	IC CX20108
IC502	8-759-700-43	IC NJM4558M
IC503	8-759-908-17	IC TL082CPS
IC504	8-759-700-75	IC NJM2901MB
IC505	8-759-700-75	IC NJM2901MB
IC506	8-759-908-81	IC MB3763PF

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTRICAL PARTS

Ref.No.	Part No.	Description
IC507	8-759-908-81	IC MB3763PF
IC508	8-759-908-81	IC MB3763PF
IC509	8-759-200-79	IC TC4049BF
IC601	8-759-912-52	IC CX23035
IC602	8-759-302-69	IC HM6116FP-3
IC603	8-759-908-17	IC TL082CPS
IC604	8-759-908-17	IC TL082CPS
IC801	8-759-914-62	IC MB88541-124M
IC802	8-759-912-55	IC S-81250HG
IC851	8-759-200-78	(D-5:UP TO SERIAL No.104000) ...IC TC4030BF
IC852	8-759-200-76	(D-5:UP TO SERIAL No.104000) ...IC TC4027BF
IC853	8-759-200-70	(D-5:UP TO SERIAL No.104000) ...IC TC4015BF
J301	1-507-787-21	JACK, LINE ORT
J302	1-507-787-11	JACK, HEADDPHONES
JR1	1-216-296-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 0 5% 1/8W
JR2	1-216-296-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 0 5% 1/8W
JR3	1-216-295-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 0 5% 1/10W
JR301	1-216-295-00	METAL CHIP 0 5% 1/10W
JR302	1-216-295-00	METAL CHIP 0 5% 1/10W
JR303	1-216-296-00	(D-5:SERIAL No.104001 AND LATER,D-50)... METAL CHIP 0 5% 1/8W
JR304	1-216-296-00	(D-5:SERIAL No.104001 AND LATER,D-50)... METAL CHIP 0 5% 1/8W
JR502	1-216-295-00	METAL CHIP 0 5% 1/10W
JR601	1-216-296-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 0 5% 1/8W
JR602	1-216-295-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 0 5% 1/10W
JR851	1-216-296-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/8W
JR852	1-216-296-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/8W
JR853	1-216-296-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/8W
JR854	1-216-296-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/8W
JR855	1-216-295-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/10W
JR856	1-216-295-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/10W
JR857	1-216-295-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/10W
JR858	1-216-295-00	(D-5:UP TO SERIAL No.104000).... METAL CHIP 0 5% 1/10W

ELECTRICAL PARTS

Ref.No.	Part No.	Description
L301	1-408-728-21	INDUCTOR CHIP 1UH
L602	1-408-740-00	INDUCTOR CHIP 10UH
L603	1-405-982-00	COIL, OSC (SW1)
M901	X-2622-801-1	PC BOARD ASSY, STATOR
M902	X-3320-102-1	MOTOR ASSY, SLED
ND901	1-806-915-11	LIQUID CRYSTAL MODULE
PS301⚠.	1-532-685-00	(UK)...LINK, IC
Q1	8-729-101-07	TRANSISTOR 2SB798
Q2	8-729-901-05	TRANSISTOR DTA124EK
Q3	8-729-162-45	TRANSISTOR 2SB624-BV5
Q101	8-729-130-03	TRANSISTOR 2SK300
Q102	8-729-800-36	TRANSISTOR 2SD1048X6
Q103	8-729-800-36	TRANSISTOR 2SD1048X6
Q201	8-729-130-03	TRANSISTOR 2SK300
Q202	8-729-800-36	TRANSISTOR 2SD1048X6
Q203	8-729-800-36	TRANSISTOR 2SD1048X6
Q301	8-729-101-07	TRANSISTOR 2SB798
Q302	8-729-800-36	TRANSISTOR 2SD1048X6
Q303	8-729-800-36	TRANSISTOR 2SD1048X6
Q304	8-729-162-45	TRANSISTOR 2SB624-BV5
Q305	8-729-162-45	TRANSISTOR 2SB624-BV5
Q306	8-729-199-92	TRANSISTOR 2SD999
Q307	8-729-901-05	TRANSISTOR DTA124EK
Q308	8-729-901-00	TRANSISTOR DTC124EK
Q309	8-729-901-05	TRANSISTOR DTA124EK
Q501	8-729-800-36	TRANSISTOR 2SD1048X6
Q502	8-729-800-36	TRANSISTOR 2SD1048X6
Q503	8-729-800-36	TRANSISTOR 2SD1048X6
Q504	8-729-800-36	TRANSISTOR 2SD1048X6
Q505	8-729-800-36	TRANSISTOR 2SD1048X6
Q506	8-729-901-05	TRANSISTOR DTA124EK
Q507	8-729-800-36	TRANSISTOR 2SD1048X6
Q508	8-729-800-36	(D-5:UP TO SERIAL No.104000)... TRANSISTOR 2SD1048X6
Q509	8-729-800-36	TRANSISTOR 2SD1048X6
Q510	8-729-800-36	TRANSISTOR 2SD1048X6
Q601	8-729-800-36	TRANSISTOR 2SD1048X6
Q602	8-729-800-36	TRANSISTOR 2SD1048X6
Q603	8-729-162-45	TRANSISTOR 2SB624-BV5
Q801	8-729-901-05	TRANSISTOR DTA124EK
Q802	8-729-901-05	(D-5:UP TO SERIAL No.104000)... TRANSISTOR DTA124EK
Q803	8-729-901-00	(D-5:UP TO SERIAL No.104000)... TRANSISTOR DTC124EK

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R1	1-216-049-00	METAL CHIP	1K	5%	1/10W
R2	1-216-105-00	METAL CHIP	220K	5%	1/10W
R3	1-216-109-00	METAL CHIP	330K	5%	1/10W
R4	1-216-105-00	METAL CHIP	220K	5%	1/10W
R5	1-216-104-00	METAL CHIP	200K	5%	1/10W
R7	1-216-076-00	METAL CHIP	13K	5%	1/10W
R8	1-216-071-00	METAL CHIP	8.2K	5%	1/10W
R9	1-216-089-00	METAL CHIP	47K	5%	1/10W
R10	1-216-056-00	METAL CHIP	2K	5%	1/10W
R11	1-216-073-00	METAL CHIP	10K	5%	1/10W
R12	1-216-100-00	METAL CHIP	130K	5%	1/10W
R13	1-216-102-00	METAL CHIP	160K	5%	1/10W
R14	1-216-117-00	METAL CHIP	680K	5%	1/10W
R15	1-216-073-00	METAL CHIP	10K	5%	1/10W
R17	1-216-073-00	METAL CHIP	10K	5%	1/10W
R18	1-216-049-00	METAL CHIP	1K	5%	1/10W
R19	1-216-049-00	METAL CHIP	1K	5%	1/10W
R20	1-216-091-00	METAL CHIP	56K	5%	1/10W
R21	1-216-129-00	METAL CHIP	2.2M	5%	1/10W
R22	1-216-073-00	METAL CHIP	10K	5%	1/10W
R23	1-216-063-00	METAL CHIP	3.9K	5%	1/10W
R24	1-216-057-00	METAL CHIP	2.2K	5%	1/10W
R25	1-216-043-00	METAL CHIP	560	5%	1/10W
R26	1-216-164-00	METAL CHIP	39	5%	1/8W
R27	1-216-164-00	METAL CHIP	39	5%	1/8W
R28	1-216-097-00	METAL CHIP	100K	5%	1/10W
R29	1-216-056-00	METAL CHIP	2K	5%	1/10W
R30	1-216-060-00	METAL CHIP	3K	5%	1/10W
R31	1-216-049-00	METAL CHIP	1K	5%	1/10W
R101	1-216-330-11	METAL CHIP	7.5K	1%	1/10W
R102	1-216-333-11	METAL CHIP	15K	1%	1/10W
R103	1-216-333-11	METAL CHIP	15K	1%	1/10W
R104	1-216-333-11	METAL CHIP	15K	1%	1/10W
R105	1-216-329-11	METAL CHIP	5.1K	1%	1/10W
R106	1-216-336-11	METAL CHIP	47K	1%	1/10W
R107	1-216-336-11	METAL CHIP	47K	1%	1/10W
R108	1-216-334-11	METAL CHIP	22K	1%	1/10W
R109	1-216-329-11	METAL CHIP	5.1K	1%	1/10W
R110	1-216-336-11	METAL CHIP	47K	1%	1/10W
R111	1-216-336-11	METAL CHIP	47K	1%	1/10W
R112	1-216-334-11	METAL CHIP	22K	1%	1/10W
R113	1-216-327-11	METAL CHIP	2K	1%	1/10W
R114	1-216-327-11	METAL CHIP	2K	1%	1/10W
R115	1-216-326-11	METAL CHIP	1.8K	1%	1/10W
R116	1-216-333-11	METAL CHIP	15K	1%	1/10W

ELECTRICAL PARTS

Ref.No.	Part No.	Description			
R117	1-216-328-11	METAL CHIP	4.3K	1%	1/10W
R118	1-216-333-11	METAL CHIP	15K	1%	1/10W
R119	1-216-328-11	METAL CHIP	4.3K	1%	1/10W
R120	1-216-038-00	METAL CHIP	360	5%	1/10W
R121	1-216-058-00	METAL CHIP	2.4K	5%	1/10W
R122	1-216-033-00	METAL CHIP	220	5%	1/10W
R123	1-216-073-00	METAL CHIP	10K	5%	1/10W
R124	1-216-017-00	METAL CHIP	47	5%	1/10W
R125	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R126	1-216-085-00	METAL CHIP	33K	5%	1/10W
R127	1-216-168-00	METAL CHIP	56	5%	1/8W
R128	1-216-033-00	METAL CHIP	220	5%	1/10W
R129	1-216-097-00	METAL CHIP	100K	5%	1/10W
R130	1-216-058-00	METAL CHIP	2.4K	5%	1/10W
R201	1-216-330-11	METAL CHIP	7.5K	1%	1/10W
R202	1-216-333-11	METAL CHIP	15K	1%	1/10W
R203	1-216-333-11	METAL CHIP	15K	1%	1/10W
R204	1-216-333-11	METAL CHIP	15K	1%	1/10W
R205	1-216-329-11	METAL CHIP	5.1K	1%	1/10W
R206	1-216-336-11	METAL CHIP	47K	1%	1/10W
R207	1-216-336-11	METAL CHIP	47K	1%	1/10W
R208	1-216-334-11	METAL CHIP	22K	1%	1/10W
R209	1-216-329-11	METAL CHIP	5.1K	1%	1/10W
R210	1-216-336-11	METAL CHIP	47K	1%	1/10W
R211	1-216-336-11	METAL CHIP	47K	1%	1/10W
R212	1-216-334-11	METAL CHIP	22K	1%	1/10W
R213	1-216-327-11	METAL CHIP	2K	1%	1/10W
R214	1-216-327-11	METAL CHIP	2K	1%	1/10W
R215	1-216-326-11	METAL CHIP	1.8K	1%	1/10W
R216	1-216-333-11	METAL CHIP	15K	1%	1/10W
R217	1-216-328-11	METAL CHIP	4.3K	1%	1/10W
R218	1-216-333-11	METAL CHIP	15K	1%	1/10W
R219	1-216-328-11	METAL CHIP	4.3K	1%	1/10W
R220	1-216-038-00	METAL CHIP	360	5%	1/10W
R221	1-216-058-00	METAL CHIP	2.4K	5%	1/10W
R222	1-216-033-00	METAL CHIP	220	5%	1/10W
R223	1-216-073-00	METAL CHIP	10K	5%	1/10W
R224	1-216-017-00	METAL CHIP	47	5%	1/10W
R225	1-216-065-00	METAL CHIP	4.7K	5%	1/10W
R226	1-216-085-00	METAL CHIP	33K	5%	1/10W
R227	1-216-168-00	METAL CHIP	56	5%	1/8W
R228	1-216-033-00	METAL CHIP	220	5%	1/10W
R229	1-216-097-00	METAL CHIP	100K	5%	1/10W
R230	1-216-058-00	METAL CHIP	2.4K	5%	1/10W
R301	1-216-025-00	METAL CHIP	100	5%	1/10W
R302	1-216-045-00	METAL CHIP	680	5%	1/10W

ELECTRICAL PARTS

Ref.No.	Part No.	Description
R303	1-216-337-11	METAL CHIP 51K 1% 1/10W
R304	1-216-073-00	METAL CHIP 10K 5% 1/10W
R305	1-216-089-00	METAL CHIP 47K 5% 1/10W
R306	1-216-056-00	METAL CHIP 2K 5% 1/10W
R307	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R308	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R309	1-216-089-00	METAL CHIP 47K 5% 1/10W
R310	1-216-089-00	METAL CHIP 47K 5% 1/10W
R311	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R501	1-216-081-00	METAL CHIP 22K 5% 1/10W
R502	1-216-081-00	METAL CHIP 22K 5% 1/10W
R503	1-216-105-00	METAL CHIP 220K 5% 1/10W
R504	1-216-089-00	METAL CHIP 47K 5% 1/10W
R505	1-216-057-00	METAL CHIP 2.2K 5% 1/10W
R506	1-216-055-00	METAL CHIP 1.8K 5% 1/10W
R507	1-216-097-00	METAL CHIP 100K 5% 1/10W
R508	1-216-080-00	METAL CHIP 20K 5% 1/10W
R509	1-216-093-00	METAL CHIP 68K 5% 1/10W
R510	1-216-085-00	METAL CHIP 33K 5% 1/10W
R511	1-216-089-00	METAL CHIP 47K 5% 1/10W
R512	1-216-095-00	METAL CHIP 82K 5% 1/10W
R513	1-216-081-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 22K 5% 1/10W
R513	1-216-080-00	(D-5:SERIAL No.104001 AND LATER,D-50) ...METAL CHIP 20K 5% 1/10W
R514	1-216-081-00	METAL CHIP 22K 5% 1/10W
R515	1-216-063-00	METAL CHIP 3.9K 5% 1/10W
R516	1-216-121-00	METAL CHIP 1M 5% 1/10W
R517	1-216-056-00	METAL CHIP 2K 5% 1/10W
R518	1-216-091-00	METAL CHIP 56K 5% 1/10W
R519	1-216-073-00	METAL CHIP 10K 5% 1/10W
R520	1-216-085-00	METAL CHIP 33K 5% 1/10W
R521	1-216-073-00	METAL CHIP 10K 5% 1/10W
R522	1-216-073-00	METAL CHIP 10K 5% 1/10W
R523	1-216-081-00	METAL CHIP 22K 5% 1/10W
R524	1-216-067-00	METAL CHIP 5.6K 5% 1/10W
R525	1-216-089-00	METAL CHIP 47K 5% 1/10W
R526	1-216-089-00	METAL CHIP 47K 5% 1/10W
R527	1-216-077-00	METAL CHIP 15K 5% 1/10W
R528	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R529	1-216-073-00	METAL CHIP 10K 5% 1/10W
R530	1-216-073-00	METAL CHIP 10K 5% 1/10W
R531	1-216-331-00	METAL CHIP 9.1K 1% 1/10W
R532	1-216-056-00	METAL CHIP 2K 5% 1/10W
R533	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R534	1-216-104-00	METAL CHIP 200K 5% 1/10W

ELECTRICAL PARTS

Ref.No.	Part No.	Description
R535	1-216-057-00	METAL CHIP 2.2K 5% 1/10W
R536	1-216-049-00	METAL CHIP 1K 5% 1/10W
R537	1-216-049-00	METAL CHIP 1K 5% 1/10W
R538	1-216-057-00	METAL CHIP 2.2K 5% 1/10W
R539	1-216-057-00	METAL CHIP 2.2K 5% 1/10W
R540	1-216-049-00	METAL CHIP 1K 5% 1/10W
R541	1-216-049-00	METAL CHIP 1K 5% 1/10W
R542	1-216-057-00	METAL CHIP 2.2K 5% 1/10W
R543	1-216-335-11	METAL CHIP 24K 1% 1/10W
R544	1-216-332-11	METAL CHIP 11K 1% 1/10W
R545	1-216-324-11	METAL CHIP 10K 1% 1/10W
R546	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R547	1-216-324-11	METAL CHIP 10K 1% 1/10W
R548	1-216-055-00	METAL CHIP 1.8K 5% 1/10W
R549	1-216-324-11	METAL CHIP 10K 1% 1/10W
R550	1-216-331-11	METAL CHIP 9.1K 1% 1/10W
R551	1-216-331-11	METAL CHIP 9.1K 1% 1/10W
R552	1-216-324-11	METAL CHIP 10K 1% 1/10W
R553	1-216-100-00	METAL CHIP 130K 5% 1/10W
R554	1-216-089-00	METAL CHIP 47K 5% 1/10W
R555	1-216-075-00	METAL CHIP 12K 5% 1/10W
R556	1-216-060-00	METAL CHIP 3K 5% 1/10W
R557	1-216-081-00	METAL CHIP 22K 5% 1/10W
R558	1-216-089-00	METAL CHIP 47K 5% 1/10W
R559	1-216-089-00	METAL CHIP 47K 5% 1/10W
R560	1-216-049-00	METAL CHIP 1K 5% 1/10W
R561	1-216-041-00	METAL CHIP 470 5% 1/10W
R562	1-216-324-11	METAL CHIP 10K 1% 1/10W
R563	1-216-332-11	METAL CHIP 11K 1% 1/10W
R564	1-216-332-11	METAL CHIP 11K 1% 1/10W
R565	1-216-324-11	METAL CHIP 10K 1% 1/10W
R566	1-216-057-00	METAL CHIP 2.2K 5% 1/10W
R567	1-216-049-00	METAL CHIP 1K 5% 1/10W
R568	1-216-049-00	METAL CHIP 1K 5% 1/10W
R569	1-216-057-00	METAL CHIP 2.2K 5% 1/10W
R570	1-216-107-00	METAL CHIP 270K 5% 1/10W
R571	1-216-104-00	METAL CHIP 200K 5% 1/10W
R572	1-216-104-00	METAL CHIP 200K 5% 1/10W
R573	1-216-102-00	METAL CHIP 160K 5% 1/10W
R574	1-216-049-00	METAL CHIP 1K 5% 1/10W
R575	1-216-049-00	METAL CHIP 1K 5% 1/10W
R576	1-216-080-00	METAL CHIP 20K 5% 1/10W
R577	1-216-080-00	METAL CHIP 20K 5% 1/10W
R578	1-216-049-00	METAL CHIP 1K 5% 1/10W
R579	1-216-049-00	METAL CHIP 1K 5% 1/10W
R580	1-216-049-00	METAL CHIP 1K 5% 1/10W

ELECTRICAL PARTS

Ref.No.	Part No.	Description
R581	1-216-049-00	METAL CHIP 1K 5% 1/10W
R582	1-216-049-00	METAL CHIP 1K 5% 1/10W
R583	1-216-049-00	METAL CHIP 1K 5% 1/10W
R584	1-216-077-00	METAL CHIP 15K 5% 1/10W
R585	1-216-097-00	METAL CHIP 100K 5% 1/10W
R586	1-216-080-00	METAL CHIP 20K 5% 1/10W
R587	1-216-089-00	METAL CHIP 47K 5% 1/10W
R588	1-216-083-00	METAL CHIP 27K 5% 1/10W
R589	1-216-121-00	METAL CHIP 1M 5% 1/10W
R590	1-216-073-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 10K 5% 1/10W
R591	1-216-073-00	METAL CHIP 10K 5% 1/10W
R592	1-216-073-00	METAL CHIP 10K 5% 1/10W
R593	1-216-073-00	(D-5:UP TO SERIAL No,104000)... METAL CHIP 10K 5% 1/10W
R595	1-216-097-00	METAL CHIP 100K 5% 1/10W
R597	1-216-097-00	METAL CHIP 100K 5% 1/10W
R598	1-216-104-00	METAL CHIP 200K 5% 1/10W
R599	1-216-104-00	METAL CHIP 200K 5% 1/10W
R601	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R602	1-216-059-00	METAL CHIP 2.7K 5% 1/10W
R603	1-216-338-00	METAL CHIP 30K 1% 1/10W
R604	1-216-338-00	METAL CHIP 30K 1% 1/10W
R605	1-216-072-00	METAL CHIP 9.1K 5% 1/10W
R606	1-216-076-00	METAL CHIP 13K 5% 1/10W
R607	1-216-085-00	METAL CHIP 33K 5% 1/10W
R608	1-216-049-00	METAL CHIP 1K 5% 1/10W
R609	1-216-097-00	METAL CHIP 100K 5% 1/10W
R610	1-216-097-00	METAL CHIP 100K 5% 1/10W
R611	1-216-064-00	METAL CHIP 4.3K 5% 1/10W
R612	1-216-097-00	METAL CHIP 100K 5% 1/10W
R613	1-216-121-00	METAL CHIP 1M 5% 1/10W
R614	1-216-078-00	METAL CHIP 16K 5% 1/10W
R615	1-216-056-00	METAL CHIP 2K 5% 1/10W
R616	1-216-069-00	METAL CHIP 6.8K 5% 1/10W
R617	1-216-069-00	METAL CHIP 6.8K 5% 1/10W
R618	1-216-078-00	METAL CHIP 16K 5% 1/10W
R619	1-216-098-00	METAL CHIP 110K 5% 1/10W
R620	1-216-075-00	METAL CHIP 12K 5% 1/10W
R621	1-216-074-00	METAL CHIP 11K 5% 1/10W
R622	1-216-073-00	METAL CHIP 10K 5% 1/10W
R623	1-216-053-00	METAL CHIP 1.5K 5% 1/10W
R624	1-216-078-00	METAL CHIP 16K 5% 1/10W
R625	1-216-089-00	METAL CHIP 47K 5% 1/10W
R626	1-216-081-00	METAL CHIP 22K 5% 1/10W
R627	1-216-089-00	METAL CHIP 47K 5% 1/10W

ELECTRICAL PARTS

Ref.No.	Part No.	Description
R628	1-216-047-00	METAL CHIP 820 5% 1/10W
R629	1-216-037-00	METAL CHIP 330 5% 1/10W
R630	1-216-018-00	METAL CHIP 51 5% 1/10W
R631	1-216-073-00	METAL CHIP 10K 5% 1/10W
R632	1-216-080-00	METAL CHIP 20K 5% 1/10W
R633	1-216-065-00	METAL CHIP 4.7K 5% 1/10W
R700	1-216-097-00	METAL CHIP 100K 5% 1/10W
R801	1-216-073-00	METAL CHIP 10K 5% 1/10W
R802	1-216-073-00	METAL CHIP 10K 5% 1/10W
R803	1-216-073-00	METAL CHIP 10K 5% 1/10W
R804	1-216-073-00	METAL CHIP 10K 5% 1/10W
R806	1-216-085-00	METAL CHIP 33K 5% 1/10W
R807	1-216-085-00	METAL CHIP 33K 5% 1/10W
R808	1-216-085-00	METAL CHIP 33K 5% 1/10W
R809	1-216-073-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 10K 5% 1/10W
R809	1-216-331-00	(D-5:SERIAL No.104001 AND LATER,D-50) ....METAL CHIP 9.1K 1% 1/10W
R851	1-216-073-00	(D-5:UP TO SERIAL No.104000)... METAL CHIP 10K 5% 1/10W
R901	1-247-777-00	CARBON 5.6 5% 1/6W
RV1	1-230-518-11	RES, ADJ, METAL GLAZE 220K
RV2	1-230-518-11	RES, ADJ, METAL GLAZE 220K
RV301	1-230-260-00	RES, VAR, CARBON 10K/10K (VOLUME)
RV501	1-230-516-11	RES, ADJ, METAL GLAZE 10K
RV502	1-230-517-11	RES, ADJ, METAL GLAZE 22K
RV503	1-230-515-11	RES, ADJ, METAL GLAZE 2.2K
RV504	1-230-517-11	RES, ADJ, METAL GLAZE 22K
S801	1-553-510-00	SWITCH, SLIDE (POWER)
S901⚠.	1-507-956-11	JACK (LASER ON)
S902	1-553-682-21	SWITCH, LEAF (OPEN/CLOSE)
S903	1-553-198-00	SWITCH, LEAF (LIMIT)
S904	1-554-371-00	SWITCH, TACT (REMAIN)
S905	1-554-371-00	SWITCH, TACT (MODE)
S906	1-554-371-00	SWITCH, TACT (PLAY/PAUSE)
S907	1-554-371-00	SWITCH, TACT (FF)
S908	1-554-371-00	SWITCH, TACT (FR)
S909	1-554-371-00	SWITCH, TACT (STOP)
X301	1-527-948-00	VIBRATOR, CRYSTAL, 35.003MHz
X601	1-567-301-11	OSCILLATOR, CRYSTAL, 8.4672MHz

The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ACCESSORY & PACKING MATERIAL

Part No.	Description
1-463-364-00	(E).....ADAPTOR, AC
1-463-431-00	(UK)....ADAPTOR, AC (AC-230A)
1-463-432-00	(AEP)...ADAPTOR, AC (AC-230A)
1-463-487-00	(D-5)...ADAPTOR, AC (AC-190(W)USA)
1-555-658-21	CORD, CONNECTION (RK-G129)
3-701-618-00	BAG, POLYETHYLENE
3-701-624-00	(US,UK,AEP)...BAG, POLYETHYLENE
3-760-008-11	(D-50)...MANUAL, INSTRUCTION
3-760-008-22	(D-5)....MANUAL, INSTRUCTION
3-760-008-41	(AEP)....MANUAL, INSTRUCTION
*3-795-629-11	(AEP)...INSTRUCTION
3-795-748-21	(D-5)...SAFETY INSTRUCTIONS, HEADPHONE
4-907-094-02	HANDLE
4-907-095-01	SHEET, PROTECTION
4-907-096-01	CASE, ADAPTOR
4-907-097-01	(UK,E)...SUPPORT (A)
4-907-098-01	(D-5)....SAPORTOR (B)
4-907-099-01	(AEP)....SUPPORT (C)
4-907-705-01	CUSHION (R)
4-907-706-01	CUSHION (L)
4-908-701-01	(US,UK,E)...HOLDER
4-908-703-02	(D-5)....INDIVIDUAL CARTON
4-908-708-01	(D-50)...INDIVIDUAL CARTON

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